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EXECUTIVE DOCUMENTS

OF THE

HOUSE OF REPRESENTATIVES

FOR THE

FIRST SESSION OF THE [illegible]SECOND [illegible]

1891-'92.

IN THIRTY-EIGHT VOLUMES.

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INDEX TO EXECUTIVE DOCUMENTS OF HOUSE OF REPRESENTATIVES.

CONTENTS OF THE VOLUMES.

Vol. 1..FOREIGN RELATIONS: No. 1, pt. 1.
Vol. 2..WAR: No. 1, pt. 2, v. 1.
Vol. 3.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 1.
Vol. 4.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 2.
Vol. 5.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 3.
Vol. 6.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 4.
Vol. 7.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 5.
Vol. 8.. ENGINEERS: No. 1, pt. 2, v. 2, pt. 6.
Vol. 9.. ORDNANCE: No. 1, pt. 2, v. 3.
Vol. 10.. SIGNAL OFFICER: No. 1, pt. 2, v. 4.
Vol. 11.. INSPECTOR-GENERAL: No. 1, pt. 2, v. 5.
Vol. 12..NAVY: No. 1, pt. 3.
Vol. 13..POSTMASTER-GENERAL: No. 1, pt. 4.
Vol. 14..INTERIOR: No. 1, pt. 5, v. 1.
Vol. 15.. No. 1, pt. 5, v. 2.
Vol. 16.. No. 1, pt. 5, v. 3.
Vol. 17.. GEOLOGICAL SURVEY: No. 1, pt. 5, v. 4, pt. 1.
Vol. 18..INTERIOR: GEOLOGICAL SURVEY: No. 1, pt. 5, v. 4, pt. 2.
Vol. 19.. EDUCATION: No. 1, pt. 5, v. 5.
Vol. 20..AGRICULTURE: No. 1, pt. 6.
Vol. 21..DISTRICT OF COLUMBIA: No. 1, pt. 7.
Vol. 22..No. 1, pt. 8, and Nos. 4 and 7.
Vol. 23..No. 2, FINANCE REPORT.
Vol. 24..No. 3, part 1.
Vol. 25..No. 3, part 2.
Vol. 26..Nos. 5, 94, and 205.
Vol. 27..No. 6, part 1.
Vol. 28..No. 6, part 2.
Vol. 29..Nos. 8 to 28, inclusive.
Vol. 30..Nos. 29 to 46, inclusive, except No. 43.
Vol. 31..No. 43, part 1.
Vol. 32..No. 43, part 2.
Vol. 33..Nos. 47 to 79, inclusive.
Vol. 34..Nos. 80 to 135, inclusive, except No. 94.
Vol. 35..Nos. 136 to 200, inclusive, except No. 161.
Vol. 36..No. 161.
Vol. 37..Nos. 201 to 275, inclusive, except Nos. 205 and 232.
Vol. 38..No. 232.

EXECUTIVE DOCUMENTS INDEX.

Subject.	No.	Vol.
Agricultural Department. (*See* Department of Agriculture.)		
Alaska, estimate for survey of boundary of	154	35
natives of Seal Island, request for appropriation for food, etc	111	34
Albatross (steamer), estimate for expenses of, in Bering Sea	168	35
estimate of deficiency by trip to Alaska	103	34
Algiers, La., report of survey to locate dry dock at	79	33
American Association of Students (Paris), relative to rent of building for	165	35
Antietam, estimate for battle lines and sites at	146	35
Appropriations, Alaska, natives of Seal Island	154	35
to complete survey of boundary	111	34
annual, Book of Estimates of	5	26
bailiffs and criers in District of Columbia	220	37
Board of Lady Managers, World's Columbian Exposition	157	35
Cheyenne and Arapahoe Indians, for support of	198	35
claims against United States, defending suits in	150	35
Court of Claims, for additional room for files	186	35
Court of Private Land Claims, for printing notice of organization of	224	37

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Subject.	No.	Vol.
Appropriations, courts, additional, for	223	37
deficiencies	194	35
customs, collection of	11	29
deficiencies in Department of the Interior	131	34
deficiencies in Department of Justice	201	37
	245	37
deficiency estimates for subsistence of the Sioux Indians	64	33
deficiency for fees and expenses of examining surgeons	217	37
Department of Justice, marshals, etc. (deficiency)	267	37
District of Columbia (deficiency)	253	37
Eleventh Census, to continue	51	33
estimates of deficiencies in, of the various Departments	94	26
	205	26
Indian service, deficiencies	145	35
Intercontinental Railway Commissioners, salary of	113	34
money-order system, increase in	213	37
ocean mail service	219	37
Pacific Branch, Soldiers' Home, for improvement of	141	35
permanent and indefinite, letter relative to House bill 448, to repeal	152	35
postal service (deficiency)	192	35
post traders' buildings, to purchase	207	37
prisons, erection of	130	34
Rainy Lake River, to establish Government post at mouth of	158	35
revenue steamer for Baltimore (additional)	122	34
Rock Island Arsenal	191	35
State Department, printing and binding	242	37
to enforce Chinese exclusion acts	244	37
Treasury Department, additional space for	248	37
Utah penitentiary	139	35
	115	34
War Department, for printing and binding	136	35
Washington (D. C.) post-office	140	35
World's Columbian Exposition, Government exhibit	153	35
World's Columbian Exposition, postal service	246	37
Arms, obsolete, etc., relative to disposition of	174	35
Army, relative to—		
brevet rank, relative to amendment of act of February 27, 1890	249	37
brevets of, relative to Senate bill 2699, relating to	269	37
desertions from	209	37
infantry arm, petition relative to bill (Senate) for reorganization	239	37
relief of certain officers of the Pay Department of	135	34
sergeant of ordnance, letter relative to clothing allowance for	48	33
transportation, list of claims allowed for	258	37
report of Secretary of War on civilian employés in	19	29
to print drill regulations	250	37
Arapahoes. (*See* Indians.)		
Arbitration, relative to appropriation for, between United States and Great Britain	212	37
Arizona, relative to unsurveyed lands in	214	37
Arlington Cemetery, relative to burial of families of officers in	231	37
Attorney-General:		
Communications from—		
Annual report of	7	22
Beers, C. W., claim of	195	35

Digitized by Google

Subject.	No.	Vol.
Attorney-General:		
Communications from—		
Claims of bailiffs for 1889, estimates for payment of	257	37
Claims of bailiffs, New Jersey district, submitting papers on	259	37
Court of Claims, list of unpaid costs in	266	37
Court of Private Land Claims, letter relative to increasing appropriation for	84	34
Courts, estimates for additional appropriations for	223	37
of deficiency in appropriations	194	35
Department of Justice, list of minor employés in	247	37
	201	37
deficienoies in	245	37
submitting deficiency estimates for marshals, etc	267	37
District of Columbia, relief of bailiffs and criers of the Supreme Court of	220	37
English, Allen R., submitting estimate for payment of services	215	37
Fox and Wisconsin rivers, award of damages incident to improvement of	222	37
Government dams, submitting papers relative to injury to Mississippi River in Minnesota	178	35
Judgments, submitting list of, rendered against United States since February 9, 1891	9	29
list of, rendered in circuit and district courts	243	37
McNeils Island penitentiary, relative to water supply of	78	33
Mission Indians, relative to continuing special attorney for	97	34
Prisons, letter requesting appropriation for erection of	130	34
Reading Railroad Company, response to resolution of House as to whether it has violated the antitrust law	238	37
Sugar trust, response to inquiry of the House relative to suit against	225	37
United States prisons, relative to appropriations to erect	130	34
Utah penitentiary, estimate for electric-light plant	115	34
estimates of appropriations	139	35
transmitting letters of U. S. marshal relative to, part 2	139	35
Barnegat and Navesink, N. J., to reconvey site to owners at	149	35
Beers, C. W., claim of	195	35
Big Sandy River, Kentucky, report on movable dam near Louisa	25	29
Big Stone Lake, report of survey	127	34
Bishop, Joshua, petition for relief	50	33
Board of Ordnance and Fortification, report of	12	29
Bonds of United States, response to resolution of House relative to extension of 4½ per cents	134	34
Borland, T. R., attorney, expenses of, in procuring land for lighthouse depot at Portsmouth	230	37
Brazos River, Texas, report of examination of	63	33
Brunswick Outer Bar, Georgia, report of survey	34	30
Bureau of Statistics (*see* also Treasury Department):		
Report of foreign commerce, etc., part 1	6	27
Report on internal commerce, part 2	6	28
Canopitsit Channel, Massachusetts, report of survey	59	33
Cape Fear River, North Carolina, estimates for lighting new channel in	117	34
Cheyennes. (*See* Indians.)		
Chicago, Ill., papers, etc., relative to question of jurisdiction of harbor of	270	37
Chile, message of the President on	91	34
Chinese exclusion acts, estimates of appropriation to enforce	244	37
Chippewas. (*See* Indians.)		
Civilian engineers, list of, employed on rivers and harbors, compensation, etc	75	33
Civil Service Commission, annual report of	1	22

Digitized by Google

Subject.	No.	Vol.
Claims:		
Allowed by accounting officers and paid from indefinite appropriations	184	35
Allowed by accounting officers of the Treasury Department (exhausted balance, etc.)	199	35
Bailiffs for 1880, estimates for payment of	257	37
New Jersey district, for 1891	259	37
Certain, of Oregon and Washington Indian war	203	37
Deficiency in appropriation for defending suits in, against United States	150	35
Services of deputy marshals in Alabama	144	35
	210	37
Under Fourth of July act allowed since February 1, 1891	208	37
Clarendon and Lower White rivers, Arkansas, report of survey	118	34
Coast and Geodetic Survey, report of changes made in force of	180	35
expenditures for 1891	151	35
Superintendent of, part 1	43	31
part 2	43	32
Coinage, gold and silver, response to House resolution asking amount of, from June 30, 1891, to March 1, 1892	177	35
Columbia (Tenn.) Arsenal, supplemental appropriations for	121	34
Columbia (Upper) River and Aucke River, letter suggesting extension of improvement to Asotin	77	33
Columbia River, report of Secretary of War on survey of	38	30
Washington, report on survey of	36	30
Commercial relations, report of United States consuls on	204	37
Commissioner of Indian Affairs, annual report of disbursements of	8	29
communication from, relative to legalizing records in Indian Office	73	33
Commissioner of Internal Revenue, report of	4	22
Commissioner of Labor, seventh annual report of	232	38
Comptroller of the Currency, annual report, part 1	3	24
(report on national banks) part 2	3	25
Conneaut Harbor, Ohio, report of survey	42	30
Constantinople, salary of interpreter at	110	34
Consuls, report of, on commercial relations	204	37
Contract labor laws, report of expenditures for enforcement of	162	35
Court of Claims, estimate of appropriation for additional space for files of	186	35
list of judgments rendered by	211	37
list of costs in defending the Government in suits in	266	37
Court of Private Land Claims, relative to increasing estimates for	84	34
estimates for printing notice of organization of	224	37
Courts of United States:		
Bailiffs and criers in supreme court of the District of Columbia, payment of wages to	220	37
Claims of bailiffs of, for 1887, estimates for payment of	257	37
Claims of bailiffs of New Jersey district for 1891	259	37
Deficiency in appropriation for	194	35
Estimates for additional appropriations for	223	37
Judgments, list of, rendered in, as against the United States	243	37
Crooks, James, claim of	95	34
Currency, relative to free transportation of	68	33
report of Comptroller of, part 1	3	24
Customs duties, etc., letter with detailed statement of	124	34
Customs, estimate of appropriations for collection of	11	29
Customs service, official emoluments of officers in	120	34
estimate of appropriation for, in connection with World's Fair	260	37
Cypress Bayou, Louisiana and Texas, report on survey	126	34
Deer Point, Pensacola Bay, Florida, estimate to erect light	167	35

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Subject.	No.	Vol.
Deficiencies. (*See* Appropriations.)		
Delaware Bay, report of estimate, etc., for harbor of refuge	112	34
Department of Agriculture, annual report of Secretary on	1	20
statement of expenditures in the	55	33
Department of the Interior, annual report on operations of	1	14-16
contingent expenses, statement of expenditures for	47	33
Office of Indian Affairs, in relation to a chief clerk for	193	35
Department of Justice, deficiency estimates for marshals, etc	267	37
employés in, list of minor	247	37
estimates of deficiencies in	201 245	37 37
Department of State, consulates, estimates of deficiency for contingent expenses of	263	37
estimates of appropriation for printing and binding for	242	37
manuscript papers, letters, relative to binding of	164	35
public documents, relative to Senate bill 1549, for distribution, etc., of	189	35
Desert lands. (*See* Public lands.)		
Director of the Mint, annual report	200	35
District of Columbia, annual report of Commissioners of	1	29
electrical commission, report of	15	27
estimates of deficiencies in appropriations	253	37
rent of buildings in, by the Government	241	37
report of superintendent of charities of	46	30
statement showing buildings rented in, by Post-Office Department	227	37
supplemental estimates of deficiencies in appropriations for	233	37
Doboy and Sapelo, Georgia, report of survey of inner route between	62	33
Dominican Republics, response to House resolution relative to concessions by	123	34
statement of imports and exports to, 1890 and 1891	106 107	34 34
Dry dock, Gulf of Mexico, report of survey	79	33
Eastern Branch, Potomac River, letter of Secretary of War with report of survey	30	30
Educational report	1	19
Electrical Commission of the District of Columbia, report on location, arrangement, and operation of electric wires	15	29
Eleventh Census, request for immediate action on estimate to continue	51	33
Elliott, George H., for relief of	143	35
Ellis Island, receipts on account of immigrant station at	147	35
Engineers, annual report of Chief of	1	3-8
English, Allen R., estimates to pay for services	215	37
Examining surgeons, letter transmitting deficiency estimates for fees and expenses of	217	37
Fernandez, Joseph, relief of	185	35
Finance report, Secretary of the Treasury	2	23
Fish and Fisheries, *Albatross* (steamer), estimate relative to deficiency by expenses of, to Alaska	103	34
Fish hatchery, Vermont, estimates for completion of	255	37
Fond du Lac Chippewas. (*See* Indians.)		
Foreign commerce and navigation, etc., report of Chief of Bureau of Statistics on	6	27
Foreign relations	1	1
Fortifications, armament of, special estimate for	182	35
Fort Monroe, Va., estimates for sewerage system of	172	35

Digitized by Google

Subject.	No.	Vol.
Fort Sullivan Reservation, Eastport, Me., draft of bill restoring to War Department	237	37
Fourth of July claims, list of, examined and allowed since February 1, 1891	208	37
Fox and Wisconsin rivers, award of damages incident to improvement	222	37
Geographic names, report of United States board of	16	29
Geological Survey, part 1 (geology)	1	17
part 2 (irrigation)	1	18
Gilman, John R., claim of	85	34
Gold and silver certificates, report of, issued since 1878	160	35
Government—		
Deficiency in appropriation for defending suits for claims against	150	35
Rent of buildings in District of Columbia by the	241	37
Report with list of judgments rendered against	9	29
Grand Army of the Republic, letters recommending appropriation for reception and entertainment of, in the District of Columbia	173	35
Grand Rapids, Mich., report of survey below Grand Rapids	197	35
Grand River, Ohio, report of survey	61	33
Great Lakes, report on obstructions to navigation in	24	29
Greenville, S. C., relative to heating apparatus for public building at	188	35
Guns, estimate of appropriation for machine guns of small-arms caliber	129	34
type, and others, report showing cost of	13	29
Harlan and Hollingsworth Company, claim of	202	37
Hot Springs, Ark., Army and Navy hospital, estimates for improvement, etc., of grounds	156	35
Hudson River, report relative to improvement of navigation of	23	29
Immigration and tonnage, report of Chief of Bureau of Statistics on	6	27
Indian Department, table of disbursements for, etc	8	29
Indian lands, relative to illegal grazing of cattle on	265	37
Indian Office:		
Communication from Commissioner of Indian Affairs relating to legalizing records in	73	33
Payment of certain per diem clerks	133	34
Indian service, estimate of deficiency in appropriations for	145	35
Indians:		
Arapaho, Cheyenne, estimate of support of	198	35
Cheyenne and Arapaho land in Oklahoma	10	29
Chippewas in Minnesota, estimates for relief and civilization of	104	34
Fond du Lac, Chippewas, estimates for appropriation for	80	34
Kickapoos, agreement of Cherokee Commission with	72	33
Land patents, relative to acceptance and surrender of certain, and cancellation of	273	37
Legal costs incurred by, in contests relating to public lands, estimate for payment	83	24
Missions, estimate to continue attorney for	97	34
Pyramid Lake Reservation, agreement entered into with	71	33
Report of subsistence of, who have no treaty funds, etc	66	33
Shoshone and Arapaho, agreement entered into with	70	33
Sioux, deficiency estimates for subsistence of the	64	33
Warm Springs Reservation, report on correct location of, etc	69	33
Umatilla Reservation, estimate of cost of sale and allotment of	82	34
Indian Territory:		
Illegal grazing of cattle on certain lands in	265	37
Inspectors of mines, message of President transmitting petition of miners for appointment of	132	34
Inspector-General, report of (*see* also War Department)	1	11
Intercontinental Railway Commissioners, estimate of appropriation to pay salaries	113	34
Interior Department. (*See* Department of the Interior.)		

Digitized by Google

Subject.	No.	Vol.
Internal commerce, report of Chief of Bureau of Statistics on	6	28
Internal revenue, report of Commissioner	4	22
Interstate Commerce Commission, additional estimate for litigation to carry out orders of	170	35
Iron and steel, report of tests on (1891)	161	36
Jamaica Bay, New York, report of survey of	29	30
Judgments, report of, rendered against the United States since February 9, 1891	9	29
Kennebec River, Maine, report of survey of, from Waterville to Augusta	76	33
Kettlewell, S. H., relative to claim of	88	34
Keystone National Bank, estimate of appropriation for investigation of	119	34
Kickapoos. (*See* Indians.)		
Labor, seventh annual report of the Commissioner of	232	38
Land entries, list of, adjudicated	100	34
Lights:		
Relative to erection of, etc., Cape Fear River, North Carolina	117	34
Deer Point, Pensacola Bay, Florida	167	35
Salem Creek, New Jersey	89	34
Seul Choix Point, Michigan	190	35
Southwest Ledge, Connecticut	90	34
Willamette River, Oregon (mouth of)	116	34
Los Angeles, Cal., relative to heating apparatus for public building at	188	35
Lowry, James M., relative to act for relief of	87	34
Lynn Haven Bay, Virginia, report on survey	27	29
Macmaster & McGibbon, relative to claim of	251	37
McNeils Island, Washington, relative to water supply of penitentiary at	78	33
Mail service, new service established on railroads since March 4, 1889	272	37
Marine Corps, relative to the appropriation for, for 1893	261	37
Marine-Hospital Service, to employ a laboratory attendant	252	37
Menemsha Bight, Mass., report of survey of	60	33
Military posts, estimate to construct buildings at, and to enlarge, etc	105	34
traders, builders' estimates of appropriation to pay for	207	37
Milwaukee, Wis., relative to sale of public building at	65	33
Miners, estimate of appropriation to carry out law for the protection of lives of, in the Territories	169	35
Minnesota, Government dams, relative to damage to, on Mississippi River, in State of	178	35
Mint, annual report of Director of	200	35
Mispillion River, Delaware, report of survey	57	33
Mississippi River, damage to Government dams on, in Minnesota	178	35
relative to backwater from, at Clarendon and Lower White River	163	35
report relative to damage done to navigation by logging companies in Minnesota	183	35
Missouri River, Montana, report of survey between Great Falls and Stubbs Ferry	114	34
Monks, John, & Son, claim of	206	37
Murderkill River, Delaware, report of survey of	21	29
National banks, report of Comptroller on	3	25
National Home for Disabled Volunteers, estimate of appropriation for improvement of Pacific branch of	145	35
relative to omission of dates in appropriation for, at Washington, D. C.	98	34
National Zoölogical Park, estimate of appropriation for	102	34

Digitized by Google

Subject.	No.	Vol.
Navy Department, list of employés in	92	34
printing and binding for, proposed amendment to Senate bill, relative to	179	35
Navy report	1	12
Nell (United States launch), losses by employés on, by sinking of	93	34
New Mexico, relative to appropriation to new hall for use of the legislature of	236	37
relative to unsurveyed lands in	214	37
New River and Swansboro, N. C., report on survey of water way between	26	29
Ocean mail service, response of Postmaster-General to House resolution of inquiry	159	35
Oklahoma, claims of parties acting as deputy marshals	144	35
	210	37
illegal grazing of cattle on certain lands in	265	37
Olympia Harbor, Washington, report on survey of	32	30
Pacific Coast, California, report of examination for deep-water harbor on	39	30
Paper, letter relative to disposition of useless, in Department of State	118	34
Patrol (U. S. S.) losses of crew of	264	37
Penobscot River, Maine, report on survey of	37	30
Pensions, estimate of deficiency in appropriations for	229	37
Port Day, New York, report of survey of	67	33
Postal service, estimates of deficiencies in	216	37
	192	35
Postmaster-General:		
Communications from—		
Annual report	1	13
Conference of Postmasters, response to resolution of the House for information of	196	35
District of Columbia, statement in response to House resolution of buildings rented by Post-Office Department	227	37
Post-office appropriation bill	226	37
Mail service, response to House resolution of inquiry relative to new service established on railroads since March 4, 1889	272	37
Ocean mail service, response to House resolution of inquiry	159	35
Post-Office Department, relative to increase of force in money-order division	213	37
Washington (District of Columbia) post-office, letter relating to appropriation for equipment	140	35
World's Columbian Exposition, relative to postal service for	246	37
Postmasters, report of Postmaster-General relative to conference of, at Washington, D. C.	196	35
Post-Office Department, estimates for increase of force in money-order division	213	37
Letter of Postmaster-General relating to appropriation bill for the	226	37
Potomac River (eastern branch), report of survey	30	30
Potomac River (up to Washington), report of survey	32	30
President of the United States:		
Communications from—		
Annual message and foreign relations	1	1
Chile, concerning outrages on American sailors	91	34
Crooks, James, transmitting message relative to claim of	95	34
Dominican Republics, transmitting reply to House resolution for information of concessions granted by the	123	34
Dry Dock, Gulf of Mexico	79	33
Geographic names, letter transmitting report of United States board of	16	29
Grand Army of the Republic, transmitting communication from the Commissioners of the District of Columbia relative to an appropriation for reception of, etc	173	35

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Subject.	No.	Vol.
President of the United States:		
Communications from—		
Inspector of mines in Indian Territory, transmitting petition of miners for	132	34
Kickapoo Indians, transmitting agreement with	72	33
Mission Indians, transmitting report of commission on relief of	96	34
Pyramid Lake Reservation, transmitting agreement entered into with Indians on	71	33
Shoshone and Arapaho Indians, transmitting agreement with	70	33
World's Columbian Commission, transmitting report of	142	35
Price, Rodman M., relative to act for relief of	45	30
Printing. (*See* Public Printer.)		
Prisons, estimates for erection of	130	34
Public documents, report from Secretary of the Interior on receipt, distributions, and sales of by Department of the Interior	74	33
Public Lands:		
Desert-land law, relative to amount issued under	187	35
List of adjudicated land entries	100	34
Public Printer, letter from, containing estimates of deficiencies for printing	137	25
Puerto Rico. (*See* Dominican Republics, etc.)		
Puget Sound, Washington, report on cost, etc., of canal to connect Lakes Union, Samamish, and Washington with	40	30
Rainy Lake River, request for appropriation to establish Government post at mouth of	158	35
Reading Railroad Company, response to resolution of inquiry from House as to violation of antitrust law by	238	37
Red Cross, estimate of appropriation to represent United States at Fifth International Conference	176	35
Red River of the North, Minnesota, survey of above Fergus Falls and Crookston	127	34
Requisitions, letter of Secretary of Treasury in response to resolution of inquiry as to unpaid	218 274	37 37
Revenue-Cutter Service, estimates for steamer for Baltimore, Md.	122	34
estimates to construct vessels for	85	34
Rifle competitions, relative to commutation of rations for contestants in	166	35
Rock Hall Harbor, Maryland, report of survey	56	33
Rock Island Arsenal, estimate of appropriation for	191	35
Rock Island Arsenal and bridge, supplemental estimates of appropriations for	121	34
Sabine River, Texas, report of examination of	20	29
St. Mary Falls Canal, report of commerce passing through	18	29
St. Louis River, Minnesota and Wisconsin, report of survey	58	33
Salem Creek, New Jersey, to establish light at mouth of	89	34
Salt, letter of Secretary of Treasury, with certain information relative to importation of	148	35
San Diego, post and harbor defenses near, report of examination for site	14	29
San Joaqun River, California, report of survey of	108	34
Savannah-Fernandina Waterway, report of survey	41	30
Seal Islands. (*See* Alaska.)		
Secretary of Agriculture:		
Communication from—		
Annual report of	1	20
Department of Agriculture, detailed statement of expenditures of	55	33
Secretary of the Interior:		
Communications from—		
Annual report of (in five volumes)—		
The Secretary (vol. 1)	1	14
The Secretary (vol. 2)	1	15
The Secretary (vol. 3)	1	16

Digitized by Google

Subject.	No.	Vol.
Secretary of the Interior:		
Communications from—		
Cheyenne and Arapaho Indians, estimate of appropriation for support	198	35
Commissioner of Labor, seventh annual report	232	38
Deficiencies, letter of estimates of additional, in appropriations for Interior Department	131	34
Department of Interior, contingent expenses; statement of expenditures for	47	33
Desert land law, response to House resolution asking for information as to disposal of public land under	187	35
Director of the Geological Survey, part 1	1	17
Director of the Geological Survey, part 2	1	18
Educational report	1	19
Examining surgeons, estimates of fees and expenses of	217	37
Gilman, John R., submitting papers in claim of	86	34
Indians, Chippewas, in Minnesota, submitting estimates for relief and civilization of	104	34
estimates to pay costs of, in public land contests	83	34
Fond du Lac Chippewa, estimates for	80	34
statement of subsistence for, who have no treaty funds, etc	66	33
Umatilla Reservation, estimates of, cost of sale, and allotment of	82	34
Indian land patents, relative to authority to accept and cancel certain	273	37
Indian lands, response to House resolution relative to illegal grazing of cattle on, in Indian Territory and Oklahoma	265	37
Indian Office, letter relative to appropriation to pay certain per diem clerks in	133	34
Indian service, estimate of appropriation for deficiencies in	145	35
Kickapoo Indians, submitting agreement with	72	33
Land entries, transmitting list of adjudicated	100	34
Miners, submitting estimates to carry out provisions of law for protection of, in the Territories	169	35
Mission Indians, estimates to continue special attorney for	97	34
transmitting report of Commission for relief of	96	34
New Mexico and Arizona, response to resolution of House relative to unsurveyed lands in	214	37
Office of Indian Affairs, request for a chief clerk in	193	35
Oklahoma, lands of Cheyennes and Arapahoes in	10	29
Pensions, submitting estimates of deficiency in appropriations for	229	37
Public documents, report of receipt, distribution, and sales of, etc	74	33
Pyramid Lake Reservation, submitting agreement entered into with	71	33
Records of Indian Office, communication relative to legalizing	73	33
Shoshone and Arapaho Indians, submitting agreement of	70	33
Warm Springs Indian Reservation, Oregon, report of commissioners on correct location of	69	33
Wilson & Goss, for relief of	254	37
Secretary of the Navy:		
Communications from—		
Annual report	1	12
Bishop, Joshua, submitting petition of, for relief	56	33
Dry dock, Gulf of Mexico, report of survey	79	33
Harlan and Hollingsworth Company, claim of	202	37
Hot Springs Army and Navy Hospital, estimate for improvement of grounds of	156	35
Marine Corps, relative to the appropriation for 1893 for	261	37
Monks, John & Son, papers relating to claim of	206	37
Navy Department, trasmitting list of employés in	92	34

Digitized by Google

Subject.	No.	Vol.
Secretary of the Navy:		
Communications from—		
Printing and binding for Navy Department, proposed amendment to Senate bill relating to	179	35
Vanderbilt, F. W., papers in claim of	206	37
Secretary of State:		
Communications from—		
Alaska, relative to appropriation for survey of boundary of	111	34
American association of students (Paris) submitting papers relative to	165	35
Arbitration, request for appropriation to execute treaty with Great Britain	212	37
Constantinople, submitting estimates for interpreter at	110	34
Consulates, estimates of deficiencies for contingent expenses of	263	37
Crooks, James, submitting papers in case of	95	34
Dominican Republics, letter of, relative to concession of	123	34
Manuscript papers, relative to binding of, for Department of State	164	35
Papers, letter relative to disposition of useless	128	34
Printing and binding for State Department, letter relative to appropriations	242	37
Secretary of the Treasury:		
Communications from—		
Annual report on finances	2	23
Alaska, transmitting estimate for survey of boundary of	111	34
Albatross (steamer), estimate of expenses of, in Bering Sea	168	35
transmitting estimates of deficiency caused by sending to, Alaska under direction of the President	103	34
Antietam, estimates for battle lines and sites at	146	35
Appropriations, Annual Book of Estimates	5	26
deficiency for the various Departments	94, 205	26
permanent and indefinite, letter relative to House bill 448 to repeal	152	35
Arbitration, transmitting request for appropriation for, between United States and Great Britain	212	37
Armament of fortification, transmitting estimates for	182	35
Army, Pay Department, transmitting letter relative to relief of	135	34
Army transportation, submitting list of claims for, allowed	258	37
Association of American students (Paris), transmitting letter relative to rent of building for	165	35
Assistant register, to amend law for substitute in case of vacancy, etc	256	39
Barnegat and Navesink, N. J. to reconvey site to owner	149	35
Beers, C. W., claim of	195	35
Bonds of United States, response to resolution of House relative to extension of 4½ percents	134	34
Bureau of Statistics, request for additional clerk for	228	37
Cape Fear River, North Carolina, transmitting estimates for lighting new channel in	117	34
Cheyenne and Arapaho Indians, estimates for appropriation for support	198	35
Chicago, Ill., transmitting letter relative to jurisdiction over harbor of	270	37
Chinese exclusion acts, estimates of appropriation to enforce	244	37
Claims, deficiency in appropriation for defending suits in, against United States	150	35
allowed by accounting officers, letter with list of (exhausted balances due)	199	35
allowed by accounting officers and paid from indefinite appropriations	184	35

Digitized by Google

Subject.	No.	Vol.
Secretary of the Treasury:		
Communications from—		
Claims, certain, of Oregon and Washington Indian wars	203	37
of bailiffs, transmitting estimate for payment of certain, for 1889	257	37
of bailiffs of New Jersey district for 1891, transmitting letter relating to	259	37
Coast and Geodetic Survey, transmitting report of changes in	180	35
transmitting report of expenditures of, 1891	151	35
Coinage, gold and silver, response to House resolution asking amount of, from June 30, 1891, to March 1, 1892	177	35
Columbia (Tenn.) Arsenal, transmitting letter of supplemental estimates for	121	34
Commissioner of Internal Revenue	4	22
Contract labor laws, report of expenditures for enforcement of	162	35
Court of Claims, estimates of appropriations for additional space for files of	186	35
transmitting list of costs unpaid in suits in	266	37
transmitting lists of judgments of	211	37
Court of Private Land Claims, accounts for printing notice of organization of	224	37
transmitting letter for increasing estimates for	84	34
Courts of the United States, estimates for additional appropriations for	223	37
transmitting estimates of deficiency in appropriations	194	35
Currency, relative to free transportation of	68	33
Customs, submitting estimates of appropriations for collection of revenue from	11	29
Customs duties, etc., detailed statement of refund of	124	34
Customs service, transmitting abstract of official emolument of officers in	120	34
Deer Point, Pensacola Bay, Fla., estimate to erect light	167	35
Department of Interior, transmitting letter of additional estimates of deficiencies in	131	34
Department of Justice, estimates of deficiencies in	201 245	37 37
Department of State, for printing and binding	242	37
transmitting letter relative to pay of interpreter at Constantinople	110	34
transmitting estimates of deficiency for contingent expenses of consulates	263	37
transmitting letter relative to binding manuscript papers in	164	35
District of Columbia, submitting supplemental estimates of deficiencies in appropriations for	233	37
rent of buildings in, response to House resolution	241	37
transmitting estimates of deficiency in appropriations	253	37
transmitting report of superintendent of charities	46	30
Dominican Republics, etc., submitting statement of exports and imports to, 1890, 1891	106 107	34
Eleventh Census, request for immediate action on estimates to continue	51	33
Ellis Island, response to House resolution for receipts on account of immigrant station on	147	35
English, Allen R., transmitting estimate to pay for services of	215	37

Digitized by Google

Subject.	No.	Vol.
Secretary of the Treasury:		
Communications from—		
Examining surgeons, letter transmitting deficiency estimates for fees and expenses of	217	37
Fernandez, Joseph, relief of	185	35
Fish hatchery, Vermont, transmitting estimate for completion of	255	37
Fort Monroe, transmitting estimates for sewerage system for	172	35
Foreign commerce and navigation, report of chief of the Bureau of Statistics on (part 1)	6	27
Fourth of July claims, list allowed since February 1, 1891	208	37
Fox and Wisconsin rivers, award of damages incident to improvement of	222	37
Gilman, John R., transmitting letter relating to claim of	86	34
Gold and silver certificates, report of, issued since January 1, 1878	160	35
Guns, machine, of small arms caliber, transmitting letter relative to	129	34
Harlan & Hollingsworth Company, claim of	202	37
Hot Springs Army and Navy Hospital, transmitting estimates for improvement, etc., of grounds of	156	35
Indians:		
Chippewas in Minnesota, transmitting estimates for relief and civilization of	104	34
Fond du Lac Chippewas, transmitting estimates	80	34
Land contests, transmitting letter relative to costs in cases of	83	34
Missions, transmitting estimates for attorney for	97	34
Report of commission for relief of	96	34
Umatilla Reservation, transmitting estimates of cost of sale and allotment	87	34
Indian Office, transmitting letter relative to appropriation for per diem	133	43
Indian Service, transmitting estimates of deficiencies in appropriations for	145	35
Intercontinental Railway Commissioners, transmitting estimate for salaries of	113	34
Internal commerce, report of Chief of the Bureau of Statistics on (part 2)	6	28
Interstate-Commerce Commission, transmitting additional estimates to carry out orders of	170	35
Kettlewell, S. H., submitting papers relative to claim of	88	34
Keystone National Bank, transmitting estimates of appropriation for investigation of	119	34
Lowry, James M., report relative to act for relief of	87	34
Macmaster & McGibbon, letter relative to claim of	251	37
McNeils Island, penitentiary, relative to water supply of	78	33
Marine Corps, transmitting letter relative to appropriations for 1893 for	261	37
Marine-Hospital Service, letter relative to employment of a laboratory attendant	252	37
Milwaukee, relative to sale of public building at	65	33
Miners, transmitting estimate to carry out provisions of law for protection of lives of, in the Territories	169	35
Monks, John & Son, transmitting letter relative to claim of	206	37
National Home for Disabled Volunteers, estimates of appropriation for improvement of Pacific branch of	141	35
National Zoölogical Park, transmitting estimate for	102	34
New Mexico, submitting papers relative to hiring hall for legislature of	236	37
Ocean mail service, estimates for	214	37
Official business, response to House resolution for information relative to request for leave of absence on	275	37

Digitized by Google

Subject.	No.	Vol.
Secretary of the Treasury:		
Communications from—		
Oklahoma, claims of deputy marshals for services	144 210	35 37
Paper for checks and drafts, submitting estimates for purchase of	175	35
Pensions, transmitting estimates of deficiency in appropriations for	229	37
Portsmouth (Va.) light-house depot, expenses of district attorney in connection with	230	37
Postal service, estimate of deficiencies in	192	35
submitting estimates of deficiencies in	216	37
Post-Office Department, transmitting letter relative to increase of force in money-order division	213	37
Price, Rodman M., transmitting papers relative to act for relief of	45	30
Prisons, transmitting letter asking for appropriations for erection of	130	34
Public buildings, estimate for heating apparatus in certain cities	188	35
Public documents, relative to Senate bill 1549 for distribution, etc., of	189	35
Public printing, transmitting estimates of appropriation for deficiencies	137	35
Rainy Lake River, request for appropriation for Government post at mouth of	158	35
Red Cross, submitting estimates of expenses of United States delegates to Fifth International Conference of	176	35
Requisitions, letter in response to inquiry of unfilled, prior to March 1, 1892	218	37
response to House resolution as to unpaid	274	37
Revenue-Cutter Service, estimates to construct vessels for	85	34
Revenue steamer for Baltimore, letter for additional appropriations for	122	34
Rock Island Arsenal and bridge, transmitting letter of supplementary estimates for	121	34
Rock Island Arsenal, estimate of appropriation	191	35
Salem Creek, New Jersey, submitting estimates, etc., for light at mouth of	89	34
Salt, response to House resolution for certain information relative to importation of	148	35
Seal Island, Alaska, request for appropriation for food, etc., for natives of	154	35
Seul Choix, Pointe, Mich., submitting letters relative to additional expenditures for light station at	190	35
Sioux Indians, deficiency estimates for sustenance of	64	33
Southwest Ledge, Conn., submitting facts relative to changing light, etc., to steam fog whistle	90	34
Springfield (Mass.) Arsenal, transmitting letter of supplemental estimates for	121	34
Statistical Abstract:		
Report for 1891	53	33
Submitting draft of a bill for annual printing of the	54	33
Subsidiary coin, estimates of appropriation for recoinage of	181	35
Sundry civil bill, relative to the elimination of certain lines from	271	37
Tin plate, response to House resolution relative to drawbacks on	138	35
Treasury Department:		
Additional space for certain employés in	248	37
Information relative to requests for leaves on official business	275	37
First Comptroller's office, relative to extra work by employés of	268	37
Report of contingent expenses	44	30

Digitized by Google

Subject.	No.	Vol.
Secretary of the Treasury:		
Communications from—		
Treasury notes, to extend act of 1872 to certain	262	37
United States prisons, request for appropriation to carry out act for erection of	130	34
Utah penitentiary:		
Transmitting estimate for electric light for	115	34
Transmitting letter of estimates of appropriation for	139	35
Vanderbilt, F. W., transmitting papers in claim of	206	37
Wandrian (English schooner) relative to appropriation to adjust damages to	234	37
War Department:		
Transmitting estimates for additional appropriations for in office of Inspector-General	240	37
Transmitting deficiencies in appropriation for printing and binding	136	35
Transmitting supplemental estimates	81	34
Washington, District of Columbia, post-office, transmitting letter relating to appropriations for equipment	140	35
Willamette River, Oregon, transmitting estimates for light at mouth of	116	34
Wilson & Gass, for relief of	254	37
World's Columbian Exposition:		
Appropriations and expenditures by the Government, statement in response to House resolution	101	34
Estimates for postal service for	246	37
Estimate of appropriation for customs service in connection with	260	37
Estimate for Board of Lady Managers of	157	35
Government exhibit, appropriation necessary	153	35
Secretary of War:		
Communications from—		
Annual report of	1	2
Engineers, part 1	1	3
Engineers, part 2	1	4
Engineers, part 3	1	5
Engineers, part 4	1	6
Engineers, part 5	1	7
Engineers, part 6	1	8
Ordnance	1	9
Signal officers	1	10
Arlington cemetery, relative to burial of families of officers in	231	37
Armament of fortifications, estimates for	182	35
Arms, obsolete, etc., submitting letter relative to disposition of	174	35
Army, brevet rank, relative to amendment of act of February 27, 1890	249	37
brevets, submitting letter relative to Senate bill 2699	269	37
communication relative to relief of certain officers of the pay department	135	34
infantry arm, submitting petition relative to reorganization of	239	37
report of civilian employés in the	19	29
sergeants of ordnance, transmitting letter relative to clothing allowance for	48	30
to print drill regulations	250	37
transmitting bill relating to desertions from	209	37
Big Sandy River, Kentucky, report on movable dam near Louisa	25	29
Big Stone Lake, report of survey	127	34
Board of Ordnance and Fortifications, letter transmitting report of	12	29
Brazos River, Texas, report of examination of	63	33
Brunswick Outer Bar, Georgia, report of survey	34	30

Digitized by Google

Subject.	No.	Vol.
Secretary of War:		
Communications from—		
Canopitset Channel, Massachusetts, report of survey	59	33
Civilian engineers, list of, etc., employed on river and harbor work	75	33
Clarendon and Lower White River, Arkansas, report of survey	118	34
Columbia (Tenn.) Arsenal, letter of supplemental estimates for	120	34
Columbia (Upper) and Snake rivers, letter suggesting extension of improvement to Asotin	77	33
Columbia River Washington, report on survey of	36	30
Conneaut Harbor, Ohio, report of survey	42	30
Cypress Bayou, Louisiana and Texas, report on survey	126	34
Delaware Bay, transmitting report of examination and estimate for harbor of refuge	112	34
Divisions of military information, letter relating to additional room for	221	37
Doboy and Sapelo, Georgia, report of survey of inner route between	62	33
Eastern Branch, Potomac River, report of survey of	30	30
Elliott, George A., relief of	143	35
Fort Monroe, Va., submitting estimates for sewerage system for	172	35
Fort Sullivan reservation, Eastport, Me., submitting draft of line to restore to War Department	237	37
Grand River, Michigan, report of survey of, below Grand Rapids	197	35
Grand River, Ohio, report of survey	61	33
Great Lakes, report on obstructions to navigation in	24	29
Guns, machine, of small-arms caliber, estimate of appropriation for purchase of	129	34
Hudson River, report relative to survey of	23	29
Inspector-General, report of	1	11
Inspector-General's office, submitting estimate for additional force in	240	37
Jamaica Bay, New York, report on survey of	29	30
Kennebec River, Maine, report of survey from Waterville to Augusta	76	33
Lynnhaven Bay, Virginia, report on survey	27	29
Menemsha Bight, Massachusetts, report of survey	60	33
Military establishment, report of expenditures for the contingent expenses of	49	33
Military posts, estimate to construct buildings at, to enlarge, etc	105	34
traders' buildings, request for appropriation to purchase	207	37
Mispillion River, Delaware, report of survey	57	33
Mississippi River, response to House inquiry relative to injury to navigation of, in Minnesota	183	35
response to House resolution relating to backwater at Clarendon and Lower White River, Arkansas	163	35
Missouri River, Montana, report of survey between Great Falls and Stubbs Ferry	114	34
Murderkill River, Delaware, report of survey	21	29
Nell (United States launch) submitting statement of losses of employés on, by sinking of	93	34
New River and Swansboro, N. C., report on survey of water way between	26	29
Olympia Harbor, Washington, report on survey of	32	30
Pacific Coast, California, report of examination for deep-water harbor on	39	30
Patrol (U. S. S.), submitting claim for losses of clothing by crew of	264	37

Digitized by Google

Subject	No.	Vol.
Secretary of War:		
Communications from—		
Penobscot River, Maine, report on survey	37	30
Port Day, New York, report of survey of	67	33
Potomac River (up to Washington), report of survey	33	30
Printing and binding, relative to certain, for War Department	171	35
Puget Sound, Washington, report on cost, etc., of canal to connect Lakes Union, Samamish, and Washington with	40	30
Red River of the North, Wisconsin, survey of, above Fergus Falls and Crookston	127	34
Report of survey of Lower Willamette and Columbia rivers	38	30
Rifle competitions, submitting letter relative to rations for contestants in	166	35
Rock Hall Harbor, Maryland, report of survey	56	33
Rock Island Arsenal, estimates of appropriation for	191	35
Rock Island Arsenal and bridge, letter of supplemental estimates for	121	34
Sabine River, Texas, report of examination of	20	29
St. Louis River, Minnesota and Wisconsin, report of survey	58	33
St. Mary Falls Canal, transmitting report of commerce passing through	18	29
San Diego, report of examination for site for coast and harbor defenses	14	29
San Joaquin River, California, report of survey of	108	34
Savannah-Fernandina water way, report of survey	41	30
Soldiers' Home, Washington, D. C., transmitting letter requesting omission of dates in appropriations for	98	34
Springfield (Mass.) Arsenal, letter of supplemental estimates for	121	34
Surgeon-General's Office, relative to binding, etc., for	155	35
Susquehanna River, Maryland, report of survey	52	33
Swinomish Slough, Washington, report of survey	31	30
Tillamook Bay and Bar, Oregon, report of survey	35	30
Type and other guns, report on cost of	13	29
War Department, letter transmitting list of clerks and others employed in	17	29
Printing and binding, letter relative to deficiencies in appropriations for	136	35
West Galveston Bay, Texas, report of survey	22	29
Willamette River, Oregon, report of survey	28	29
Yazoo River, Mississippi, report on survey	125	34
Seul Choix Pointe, Mich., relative to additional expenditure for light station at	190	35
Shoshones (*see* Indians)	70	33
Signal officer, annual report	1	10
Sioux. (*See* Indians.)		
Smithsonian Institution, National Zoölogical Park, estimates of appropriation for	102	34
Snake River, letter suggesting extension of improvement of, to Asotin	77	33
Soldiers' Home, Washington, D. C., letter requesting omission of date in appropriations for	98	34
Pacific branch, estimate of appropriation for improvement of	145	35
Southwest Ledge, Conn., to replace light, etc., by steam fog whistle	90	34
Springfield (Mass.) Arsenal, supplemental estimates of appropriations	121	34
Statesville, N. C., relative to heating apparatus for public building at	188	35
Statistical abstract, draft of a bill to provide for annual printing of the	54	33
Report for 1891	53	33
Subsidiary coin, estimate of appropriation for recoinage of	181	35

Digitized by Google

Subject.	No.	Vol.
Sugar trust, report of suit filed against, for violation of law against trusts	225	37
Surgeon-General's Office, letter relative to binding, etc., for	155	35
Susquehanna River, Maryland, report on survey of	52	33
Swansboro and New River, North Carolina, report of survey of water way between	26	29
Swinomish Slough, Washington, letter of Secretary of War relative to improvement of	31	30
Territories, miners in, estimate to carry out law for protection of	169	35
Tests of iron and steel (1891)	161	36
Tillamook Bay and bar, Oregon, report of survey	35	30
Tin plate, response to House resolution relative to drawbacks on	138	35
Treasurer of the United States, annual report	2	23
Treasury, estimate for check and draft paper for	175	35
requisition on, relative to unpaid, to June 30, 1892	274	37
Treasury Department, additional room for certain divisions	248	37
Assistant Register, to amend law relative to substitute in case of vacancy, etc., in office of	256	37
Bureau of Statistics, relative to an additional clerk for	228	37
claims allowed by accounting officers (exhausted balances, etc.)	199	35
claims allowed by accounting officers of, and paid from indefinite appropriations	184	35
compensation, letter of the Secretary relative to eliminating certain lines in sundry civil bill relating to	271	37
First Comptroller's Office, relative to extra work by employés of	268	37
official business, relative to requests for of absence on	275	37
report of contingent expenses of	44	30
requests for leaves on official business	275	37
Treasury notes, to extend act of 1872 to certain	262	37
Type and other guns, report on cost of	13	29
Umatillas. (*See* Indians.)		
United States Coast and Geodetic Survey—		
Report of Superintendent of, part 1	43	31
Report of Superintendent of, part 2	43	32
United States prisons, relative to appropriations to erect	130	34
Utah penitentiary, estimates of appropriation for	139	35
estimates for establishing electric plant	115	34
letters of United States marshal relative to, part 2	139	37
Vanderbilt, F. W., claim of	206	35
Vicksburg, Miss., relative to heating apparatus for public building at	188	35
Wandrian (English schooner), relative to appropriation to adjust damages to	234	37
War Department:		
Annual report of Secretary	1	2
Clerks and others employed in, list of	17	29
Inspector-General's Office, relative to additional force for	240	37
Military establishment, report of contingent expenditures for	49	33
Printing and binding for, estimates of deficiency in appropriations for	136	35
Printing and binding for, letter of Secretary of War relative to	171	35
Relative to additional room space for division of military information	221	37
Supplemental estimates for the	81	34

Digitized by Google

Subject.	No.	Vol.
Warm Springs Reservation, Oregon, report of commissioners on correct location	69	33
Washington (D. C.) post-office, request for appropriation for equipment of	140	35
West Galveston Bay, Texas, report of survey	22	29
Willamette River, Oregon, estimates of appropriation for light at mouth of	116	34
report of Secretary of War on survey of lower	38	30
report of survey in Oregon	28	29
Wind River Reservation, agreement entered into by Shoshones and Arapahoes on	70	33
Wilson & Goss, for relief of	254	37
World's Columbian Commission, message of President submitting report of	142	35
World's Columbian Exposition:		
Appropriations and expenditures, statement of Government	101	34
Board of Lady Managers, estimates for expenses of	157	35
Government exhibit, report of appropriation necessary	153	35
Postal service for	246	37
Yazoo River, Mississippi, report on survey	125	34

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52D CONGRESS, 1st Session. } HOUSE OF REPRESENTATIVES. { Ex. Doc. 1, Part 3.

REPORT

OF THE

SECRETARY OF THE NAVY;

BEING PART OF

THE MESSAGE AND DOCUMENTS

COMMUNICATED TO THE

TWO HOUSES OF CONGRESS

AT THE

BEGINNING OF THE FIRST SESSION OF THE FIFTY-SECOND CONGRESS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1891.

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REPORT

OF

THE SECRETARY OF THE NAVY.

NAVY DEPARTMENT, *December 3, 1891.*

To the President:

Of the new constructions undertaken during this year, by far the most important is Protected Cruiser No. 13. This vessel, of 7,500 tons displacement, is a sister ship to Cruiser No. 12. The peculiar advantages of these two cruisers consist in their extraordinary coal endurance and their high speed, in both of which respects they have no equal among the large cruisers of the world. With a maximum speed of 22 knots an hour and a sustained sea speed of 21 knots, they can safely be counted on, in any ordinary sea, to overtake any commerce destroyer, any commerce protector, or any mercantile vessel now afloat, while their ability to cruise for great distances without recoaling makes them a peculiarly important addition to a navy destitute of coaling stations abroad. Their triple-screw propulsion, one of their most important and original features, is at once effective for high speed and economical for ordinary service. The arrangement of the screws, tending to secure constant immersion in the water, is calculated to prevent the racing so common in single-screw and twin-screw vessels, which leads not only to reduction of speed, but to material increase of loss from wear and tear. Added to these advantages are a complete armor protection against light guns, and a battery comprising one 8-inch and two 6-inch breech-loading rifles of 40 calibers, eight 4-inch rapid-fire guns of the armor-piercing type, with twenty small-caliber rapid-fire guns, and five torpedo tubes, making them formidable antagonists for any vessel they may be called upon to fight.

As with the vessels undertaken in the previous year, the battle ships and No. 12, the Department made the utmost exertions to prevent loss of time in beginning the construction of Cruiser No. 13. The act authorizing the work was approved March 2, 1891. Nine days later, on March 11, the general plans were ready, and the advertisements were issued inviting proposals. The bids were opened June 1, less than three months afterwards.

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The following were the proposals received for the hull and machinery, including engines, boilers, and appurtenances, in accordance with the plans and specifications approved by the Secretary of the Navy:

Union Iron Works, of San Francisco	$2,793,000
William Cramp & Sons' Ship and Engine Building Co., of Philadelphia	2,745,000
Bath Iron Works, Limited, Bath, Me	2,690,000

The Bath Iron Works were therefore the lowest bidders, their proposal being $55,000 less than that of Messrs. Cramp & Sons, and $103,000 less than that of the Union Iron Works.

The question of making an award under these circumstances received the most thorough and careful consideration of the Department, and a decision was made upon the following grounds:

(1) The act of August 3, 1886, requires that each contractor "shall show to the satisfaction of the Secretary of the Navy that within three months from the date of the contract he will be possessed of the necessary plant for the performance of the work in the United States, which he shall offer to undertake." This condition the Bath Iron Works were clearly unable to fulfill. They admitted that they were wholly unable to build the engines of the ship, and they did not propose to build them, but to sublet the contract. Although it is possible to build the hull of a ship at one place and her engines at another, yet the inconvenience of having the hull built at Bath and the engines built at New York would have been so great that this cause alone would have led the Department to hesitate in the case of a ship where the engines were of such vital importance.

(2) The Bath Iron Works admitted that they would be unable to build the ship within the contract time, namely, two years. Three years was the shortest time in which they expected to complete it. My own judgment and observation satisfied me that they could not build it in less than three years and a half.

Finally—and this was the most important reason of all—the Department felt that it would be too great a risk to give the building of such a vessel as Cruiser No. 13 to a new and inexperienced firm which had never yet completed a ship. This vessel, and her sister ship, No. 12, are two of the most important ships of the Navy, and they are by far the most difficult to build. They are to have a guaranteed speed of 21 knots for four hours in the open sea, a condition which, as far as known, no shipbuilding firm anywhere, except Messrs. Cramp, had at that time ever undertaken to fulfill. The statute provides that the contract shall be let to the lowest and best responsible bidder or bidders. Under these circumstances, and in view of the fact that the Messrs. Cramp finally consented to reduce their bid $55,000 (that is to say, to the figure of the lowest bid), I had no doubt that my duty, under the statute, was to award that firm the contract for Cruiser No. 13 at $2,690,000.

The second vessel in point of size and importance is the Harbor Defense Ram of 2,050 tons displacement, authorized by the act approved March

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2, 1889. Proposals for the construction of this vessel, in accordance with the Department's plans and specifications, were opened December 20, 1890. But one bid was received, that of the Bath Iron Works, of Bath, Me., for $930,000, and the contract was awarded accordingly, January 28, 1891. Since the execution of the contract, changes in the plans have been made, increasing the length of the vessel 8 feet, thus giving greater berthing capacity for the crew and space for stowage of coal, and admitting a battery of four 6-pounder rapid-fire guns to afford protection against torpedo boats. The change has materially increased the coal endurance and consequent radius of action of the vessel, while the substitution of a solid steel casting for the stem in place of the ram with removable head, as orginally designed, gives the vessel greater strength for ramming purposes. The contract requires that the harbor defense ram shall be completed and ready for delivery in 18 months from date of execution.

Proposals for the construction of the torpedo cruiser of 750 tons, authorized by the act of June 30, 1890, were invited October 18, 1890, the bids to be opened February 11, 1891. No bids were received for the construction of this vessel.

The Department has not again advertised for proposals for the torpedo cruiser, it being clear that no one would offer to build her within the prescribed limit. The act authorizing her construction requires her "to have a maximum speed of not less than 23 knots." This high rate of speed requires engines of 6,000 horse-power, and involves a correspondingly heavy expense. To build such a boat, it is estimated that the limit of cost should be increased $162,000, making $512,000, instead of $350,000, as originally projected. In view of the great merits of this type of vessel, I recommend that the law be amended to enable the Department to proceed with her construction.

The act of June 30, 1890, also authorized the construction of a torpedo boat of about 112 tons. Proposals were invited October 18, 1890, for the construction of this boat, and the bids for her construction, in accordance with the bidders' plans and specifications, were opened December 20. The bids were as follows:

Cowles Engineering Company, of Brooklyn, N. Y	$119,140
Herreshoff Manufacturing Company, of Bristol, R. I. (134 tons)	125,000
Herreshoff Manufacturing Company, of Bristol, R. I. (100 tons)	93,200

After a thorough examination of the bids submitted for the torpedo boat, the conclusion was reached that all the plans and specifications submitted by the bidders were unsatisfactory, and therefore none of the proposals were accepted.

The Department now directed the preparation of plans by the Bureaus, and on June 19, new advertisements were issued, inviting proposals on these plans. These bids were opened August 26, with the following result:

Cowles Engineering Company, of Brooklyn, N. Y	$117,490
Iowa Iron Works, of Dubuque, Iowa	113,500

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The bid of the Iowa Iron Works being the lowest one received the contract was awarded to that company October 8, for the sum of $113,500, the vessel to be completed, according to the Department's plans, in twelve months from the date of the contract.

The Navy will therefore have within a year its second torpedo boat, and it bids fair to be an improvement on the *Cushing*, whose excellent qualities have been thoroughly demonstrated; and it is a matter of additional satisfaction that it is to be built upon the interior waters of the country, thus tending to distribute more widely the benefits arising from the shipbuilding industry, and creating plants at a point remote from all possible attack.

PROGRESS OF RECENT CONSTRUCTION.

During the past year four new vessels have been placed in commission, making a total number of thirteen since March 4, 1889, as follows:

Name.	Displacement.	Commissioned.
	Tons.	
Chicago	4,500	Apr. 17, 1889
Yorktown	1,700	Apr. 23, 1889
Petrel	870	Dec. 10, 1889
Charleston	3,730	Dec. 26, 1889
Baltimore	4,400	Jan. 7, 1890
Cushing	99	Apr. 22, 1890
Vesuvius	970	June 7, 1890
Philadelphia	4,300	July 28, 1890
San Francisco	4,083	Nov. 15, 1890
Newark	4,083	Feb. 2, 1891
Concord	1,700	Feb. 14, 1891
Bennington	1,700	June 20, 1891
Miantonomoh	3,815	Oct. 27, 1891

The vessels remaining under construction, with the acts authorizing them, are as follows:

Act of August 3, 1886: *Puritan*, *Amphitrite*, *Monadnock*, *Terror*, *Maine*, *Texas*.

Act of March 3, 1887: *Monterey*.

Act of September 7, 1888: *New York*, Cruiser No. 6, *Cincinnati* (No. 7), *Raleigh* (No. 8), No. 9, *Detroit* (No. 10), No. 11, and the Practice Vessel.

Act of March 2, 1889: Harbor Defense Ram, Gunboat No. 5, Gunboat No. 6.

Act of June 30, 1890: *Indiana*, *Massachusetts*, *Oregon*, Protected Cruiser No. 12, Torpedo Cruiser, Torpedo Boat No. 2.

Act of March 2, 1891: Protected Cruiser No. 13.

All the above vessels, with the exception of the torpedo cruiser, already referred to, are making rapid and substantial progress.

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The delays in the delivery of armor may cause the dates of final completion of the twelve armored vessels in the list to be somewhat later than was contemplated when the contracts were drawn; but with the increased sources of supply of armor plate now available it is probable that this delay will be short, and it will be much more than compensated for by the superior quality of the armor which has been developed during the past year. In other respects the work upon the armored vessels now building and fitting out is proceeding satisfactorily.

The double-turreted monitor *Miantonomoh* has already been put in commission, and will be ready during this month for such trials as it may be desirable to give her, all her guns being now in position and the work of fitting the roof of the forward turret, which was necessarily postponed until the fourth gun was in place, being within a few days of completion. She will shortly start upon her first cruise. The other vessels of this class, the *Terror*, *Amphitrite*, and *Monadnock*, of 3,990 tons, and the *Puritan*, of 6,060 tons displacement, will be ready to receive their armor as soon as it can be delivered, and their completion may be expected by the spring of 1893. The 10-inch guns of the *Terror* are completed, and will be installed whenever the vessel is prepared to receive them.

The coast defense vessel *Monterey* was successfully launched April 28, 1891, and is now ready to receive her armor. Her 10-inch and 12-inch guns, with their mounts, are well advanced, and will be ready for installation when required. The ship will probably be completed some time in the year 1892.

The *Maine* has made fair progress since her launching, a year ago. The engines have been completed, and a shop trial of them took place on August 31, the power to work them being furnished by the turning engines. This test of the engines gave an opportunity to inspect carefully the adjustment and working of the valves, pistons, and other moving parts, which were found throughout to be highly satisfactory. Their installation is now making rapid progress, and will be completed in the contract time. The vessel will go into dock in December, the wooden backing will be secured in place at once, and the armor put on as fast as delivered. The vessel has for several months been ready for her transverse bulkhead armor, which was received a few weeks ago. Alterations have been made in the plans of the turrets, by which their weight has been reduced 134 tons, and this weight redistributed by increasing the thickness of the proposed barbette armor from 10½ inches to 12 inches, and the side armor from 11½ inches to 12 inches, thus adding materially to the defensive strength of the ship.

The work on the hull of the *Texas* has been especially satisfactory, the delays occurring in the previous year on account of want of material having been entirely overcome, and the ship will be ready for launching next spring. Unfortunately, in January last, work on the boilers was brought to a stop by the destruction of the contractor's boiler shops

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by fire, which also damaged the finished work and boiler material on hand, so as to make nearly all of it worthless. New shops and tools have been procured, and after a delay of about eight months the contractors have resumed work on the boilers. Notwithstanding this delay, the vessel is expected to be ready for service early in 1894.

The armored cruiser *New York* was launched successfully on the 2d instant, and her date of trial may be fixed about January, 1893. With her high speed and great coal endurance, a 6-inch protective deck, and 5-inch side armor plates of nickel steel, and a powerful battery well supplied with armor protection against the fire of everything except the heaviest guns, this vessel will be a most important addition to the naval strength of the country.

The work upon the battle ships *Indiana*, *Massachusetts*, and *Oregon* is going on rapidly, the two former having their frames erected up to the armor belt. At present, it is impossible to give with certainty the date of completion of these vessels, as much depends upon the delivery of the armor plates, as required, during the construction of the hull; but the Department has every reason to believe that except for delays on account of armor they would be completed within the contract requirements. According to present probabilities they will be ready for service early in 1894.

The progress of work upon the unarmored vessels of the Navy is equally satisfactory.

The *Detroit*, formerly known as Cruiser No. 10, was launched at the Columbian Iron Works, Baltimore, Md., on October 28, and cruiser No. 9 will be launched this year. Cruiser No. 11, building at the works of Harrison Loring, is nearly ready for launching, and unless her construction is delayed by the assignment of the contractor, which occurred on October 16, she will, together with her sister ships, Cruisers 9 and 10, be ready for service early in the autumn of next year.

Work upon the *Raleigh*, at the Norfolk navy-yard, is being pushed rapidly forward, 219 tons of material having been worked into the hull between July 1 and October 1 of this year. She will be ready for launching next month. The *Cincinnati*, which is a sister ship to the *Raleigh*, will be ready for launching at the New York navy-yard by next spring. Both these vessels will be ready for service early in 1893.

Cruiser No. 6 is under construction at the Union Iron Works, San Francisco, Cal. The work on this vessel is more than one-third completed, her construction having been somewhat delayed by difficulties in obtaining material, but unless further delays are experienced she will probably be completed during the summer of 1893.

Cruiser No. 12, contracted for by Wm. Cramp & Sons, of Philadelphia, is the most important of the unarmored cruisers now building, and her construction is progressing in a highly satisfactory manner, about three-tenths of the hull having been completed on October 1. She should be ready for service by the autumn of 1893.

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Gunboats Nos. 5 and 6, building at the Bath Iron Works, are more than half completed, and will be ready for service by next summer.

The steel practice vessel is also approaching completion. Her frames are erected, the outside plating is nearly completed, and many of the interior fittings are finished. About two-thirds of the work on the hull is now completed, and the vessel will probably be ready for final delivery by July, 1892.

Of the three contract vessels put in commission during the past year, the *Newark*, built by William Cramp & Sons, was given her final contract trial on December 22, 1890. During a four-hour test at sea, off the capes of the Delaware, the engines developed an average of 8,869 indicated horse power, the maximum horse power being 9,231. The estimated speed from patent log for the four hours' trial was 19 knots, the ship's displacement at the beginning of the trial being 3,970 tons. The behavior of the vessel during the steam, turning, and other trials was entirely satisfactory, and she is a valuable addition to the list of cruisers available for service.

The *Concord*, built by N. F. Palmer, Jr., & Co., underwent a first contract trial on November 19, 1890, but as the horse power obtained was not satisfactory to the contractors, a second trial was authorized by the Department, and took place in Long Island Sound on January 13, 1891. The engines developed during four hours an average of 3,405 indicated horse power, the maximum horse power being 3,513. The estimated speed of the ship, allowance being made for tide, was 17 knots, the average displacement during the trial being 1,707 tons.

The *Bennington*, a sister ship of the *Concord*, and also built by N. F. Palmer, Jr., & Co., underwent preliminary contract trials on February 26, February 28, and April 1, and her final contract trial on April 2, 1891. This trial took place in Long Island Sound, the engines developing during four hours an average of 3,436 indicated horse power, the maximum horse power at any time being 3,533. The estimated speed of the ship was 17.5 knots, and her displacement 1,700 tons.

The *Concord* and *Bennington* are similar to the *Yorktown*, and carry, for their size, a comparatively heavy battery, while their light draft will permit their use for some services that a larger vessel would be incapable of performing.

Since the last report the *Charleston* has received her 8-inch guns in place of the 6-inch temporarily put on board. The battery of the *Dolphin* has also been improved by the substitution of two 4-inch rapid-fire guns for the 6-inch originally assigned to the vessel.

Of the old wooden ships of the Navy there are in existence two second-rate vessels, the *Lancaster*, the present flagship of the Asiatic Station, and the *Pensacola*, now stationed at Honolulu. The *Lancaster* probably has six years of service before her, but the cruising days of the *Pensacola* are numbered. Ten third-rate vessels remain—the *Marion* and *Alliance* on the Asiatic Station; the *Mohican*, *Iroquois*, and *Thetis* on

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the Pacific; the *Kearsarge* on the North Atlantic; the *Essex* and *Yantic* on the South Atlantic, and the *Adams* at Mare Island. Of these the *Yantic* and *Adams* are probably good for five more years of service, and the others for two or three. The *Omaha*, *Swatara*, and *Nipsic* are not in condition for further cruising, and the *Enterprise* is temporarily serving the purpose of a practice vessel at the Naval Academy, until the completion of the new ship of that class.

ARMOR.

By far the most momentous question which the Department has had to consider in connection with the construction of the new navy is that of armor: first, to secure a supply of American manufacture; and secondly, to determine what kind of armor should be adopted, having reference both to its composition and mode of treatment.

The more this subject is studied the more remarkable appears the foresight and judgment with which the first contract of 1887 was effected, and the creation assured of the unequaled plant now in the last stages of completion at South Bethlehem. That difficulties and delays should attend a work of such magnitude is unavoidable, and the establishment of armor manufacture in the United States has been no exception to the rule.

The report of last year described the unsatisfactory condition, at that time, of the work under the Bethlehem contract, and the efforts that had been made by the Department to hasten it. The contract with the Bethlehem Iron Company was executed June 1, 1887, and called for the completion of the plant for the manufacture of armor by December 1, 1889. It included the armor for the *Puritan*, *Terror*, *Amphitrite*, *Monadnock*, *Maine*, and *Texas*. Three hundred tons were to be delivered by February 1, 1890, and delivery was to continue thereafter at the rate of 300 tons per month.

In July, 1890, the company stated:

> We are still expecting to commence within the next two months the manufacture of certain armor for which we have received drawings, and which we understand is now urgently needed, namely, the bulkhead plates of the *Maine*, the conning tower of the *Terror*, and the conning tower communications of the *Texas*.

As stated in the report of December, 1890, this promise, up to that time, showed no signs of fulfillment, and it was thought probable that deliveries of completed armor would hardly be ready before October 1 of the present year. The prediction proved to be correct, and the only deliveries that have thus far been made are the bulkhead plates of the *Maine*, mentioned in the letter above quoted and other small lots, amounting altogether to about 100 tons. These were received a few weeks ago, nearly two years after the stipulated time, and four years and a half after the execution of the contract.

It is understood that the heavy armor of the *Maine* and *Terror* is in course of manufacture, and the Department has now every reason to

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hope that substantial deliveries will shortly begin. The Bethlehem plant has been brought to a high state of efficiency, and the company are making still greater improvements.

In view of the delays incident to the work under the Bethlehem contract, the Department, in the summer of 1890, endeavored to secure a second source of supply, and on November 20 of that year entered into a contract with Messrs. Carnegie, Phipps & Co. for 5,900 tons of armor plates at the same price as that stipulated in the Bethlehem contract. The time fixed for deliveries to begin, July 1, 1891, seven months from the date of the contract, was too short to enable the company to complete the necessary extension of its plant. The work has, however, been vigorously pushed, and 150 tons of nickel-steel armor for the *Monterey* have been turned out and are now only awaiting the required ballistic tests prior to acceptance. If this contract had not been made, it is safe to say that the completion of many of the armored ships now under construction would have been postponed for an indefinite period.

The balance of the armor not included in either contract, estimated at between 4,000 and 5,000 tons, will be opened to competition.

The contract with Messrs. Carnegie, Phipps & Co. provided for utilizing nickel in connection with steel in the manufacture of armor. Negotiations have also been entered into with a view of substituting nickel-steel in place of all-steel armor for the vessels included in the Bethlehem contract. Under the appropriation made last year the Department has purchased 4,536 tons of nickel matte, containing about 900 tons of nickel, for this purpose.

The barbette armor of the *Monterey*, for which a special order was given to the Bethlehem Iron Company September 5, 1890, will shortly be submitted to the required ballistic tests.

The supply of armor of domestic manufacture having been provided for as above stated, it remained for the Department to determine finally the material and the method of treatment that should be adopted.

The experiments made last year at Annapolis, described in the annual report for 1890, consisted of a test of the two principal foreign types of armor, the English compound plate and the French all-steel plate, and an entirely new plate, also made in France upon the special order of the Department, of nickel-steel. The result of the trial showed that the compound plate was decidedly inferior, and that as between nickel-steel and all-steel the former had distinct and positive advantages, the all-steel plate being broken into four pieces, while the nickel plate remained absolutely uncracked.

A series of tests made during the following spring and summer confirmed the conclusions formed at the Annapolis trial as to the superiority of nickel-steel, and the Department accordingly decided to adopt it, and made arrangements with the contractors looking to that end.

It remained, however, to give a thorough trial to the first armor of domestic manufacture before beginning to place it upon the vessels, and

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for this purpose it was decided to order typical plates, which should be made the subject of an experimental test. This trial was to ascertain two points: first, whether our domestic manufacturers could produce an armor that would stand competition with the material manufactured abroad; and, second, which of the various modes of treatment suggested would give the best results. In reference to the latter point the questions to be considered were the relative merits of rolling and forging in the manufacture, and the effect of a new method of treatment, named, from its inventor, the Harvey process, designed to harden the surface of the plate while retaining the toughness of its body.

Of the six plates tried, three were furnished by the Bethlehem Iron Co., and three by Carnegie, Phipps & Co.

In these trials, which took place at Indian Head on October 31 and November 14, the plates were subjected to tests more severe than had ever been applied at any foreign government trials. Four shots were fired at each plate from a 6-inch gun with an impact velocity of 2,075 feet per second, and an energy of 2,988 foot tons, using the Holtzer projectile of 100 pounds. One shot was then fired at the center of each plate from an 8-inch gun, with an impact energy of 4,988 foot tons, using Firminy and Carpenter projectiles of 210 and 250 pounds weight, respectively. The plates were placed normal to the line of fire.

The results of the trial were in the highest degree satisfactory. Each of the six plates manufactured in this country was superior to the English compound plate, while the nickel Harveyed plate and the high carbon nickel plate were superior to all the foreign plates of the Annapolis trial. They may therefore be pronounced in advance of the best armor hitherto manufactured in Europe.

Further light was thrown upon the question of the relative merits of all-steel and nickel-steel armor, and any doubt which may have remained upon that subject was finally set at rest. Of the three plates made by Bethlehem two were of nickel-steel, one treated by the Harvey process, the other not, and the third was of all-steel, Harveyed. Both the nickel plates proved to be far superior to the all-steel Harveyed plate, notwithstanding the advantages which it may have derived from the special treatment; and both proved superior to the French all-steel plate tried at Annapolis.

A third nickel plate, manufactured by Carnegie, under the rolling process, also showed a marked superiority over the all-steel plate of this year, and both it and the corresponding Bethlehem plate manufactured under the hammer showed a capacity of resistance to perforation fully ten per cent greater than that of the French all-steel plate. In this respect the results furnished by the two American plates manufactured by the different processes (forging and rolling) proved to be remarkably uniform, the 6-inch shots that were fired at them differing in penetration but an inappreciable amount.

The trial thus definitely establishes the fact that armor of excellent quality may be produced by the rolling process, and that forging by

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means of the hammer, the greatest source hitherto of expense in manufacture, is no longer to be regarded as an absolute necessity. The importance of this fact can hardly be overestimated, for it raises a probability that within a year or two the armor-producing capacity of the United States may be quadrupled in case of necessity, and that if we had 10,000 tons to let and could give 18 months from date of contract to commence delivery, the cost of manufacture would be reduced from 25 to 33 per cent, while the work hitherto confined to two firms, would be thrown open to a large number of competitors.

Finally the trial shows that the high-carbon nickel Harveyed plate is undoubtedly the best armor plate ever subjected to ballistic test.

It may be assumed that the principle of super-carburizing steel to a considerable depth has passed beyond the experimental stage. The question of tempering or chilling the carburized armor plate needs, however, further experimental development, and the lack of uniformity in results, indicated in the Indian Head armor trials, may probably be ascribed to this want of experience. The assurance of success, however, is so great as to warrant the Department in making further experiment in this direction with every reason for anticipating a completely satisfactory result.

ORDNANCE.

The following table gives the number of guns required to arm the vessels now authorized, the number of sets of forgings ordered and delivered, and the number of guns completed.

Caliber.	Number of guns required to arm vessels provided for by law.	Number of sets of forgings ordered.	Number of sets of forgings delivered.	Number of guns completed.
4-inch	69	35	35	7
5-inch	56	29	29	8
6-inch	129	134	134	117
8-inch	51	51	30	19
10-inch	22	25	14	8
12-inch	8	8	4	1
12-inch	12	12	0	0
Total	347	294	246	155

The delivery of cartridge cases having begun, under the agreement referred to in the report of last year, a test has been made of the 4-inch rapid-fire gun. The results are extraordinarily successful. The primary object of this type of gun is rapidity of fire, and the trial resulted in an actual showing of 5 unaimed rounds in 17 seconds, or at the rate of 16 shots a minute. The gun, breech mechanism, and cartridge cases, all operated in the most satisfactory manner. The remaining guns of this caliber will be rapidly completed.

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The trial of the 5-inch rapid-fire gun will take place as soon as cartridge cases can be obtained, with every prospect of equally good results.

The number of heavy guns has largely increased during the past year, and they show marked improvements. These are mainly in the direction of increased length, thereby securing great range and flatness of trajectory, and a consequent ability to be made effective at longer distances. The 6-inch of 35 calibers will be supplied to the *Detroit* and her sister ships. One new 6-inch gun of 40 calibers has been completed and tested with highly satisfactory results. This improved gun will be supplied to the *Cincinnati* and *Raleigh*, and Cruisers Nos. 12 and 13.

The manufacture of 8-inch guns is in advance of the ships upon which they are to be placed. The forgings for two new 8-inch guns of 40 calibers' length, and therefore of exceptionally high range, have been contracted for. These are to form the batteries of Cruisers Nos. 12 and 13.

Of the 10-inch guns, the third and fourth of the *Miantonomoh's* battery have been completed, tested, and placed on board the vessel. Four others are ready for the *Terror*, and the two for the *Monterey* will shortly be finished.

The first 12-inch gun of 35 calibers has been completed and is now, with its mount, at the proving ground for trial. Three more guns of this caliber are in course of construction.

Forgings for the tube and the jacket of the first of the 13-inch guns intended for the armament of the ships of the Indiana class have been completed and will shortly be delivered.

No 16-inch guns have yet been called for in the armaments of new ships. If such guns should be found desirable, the gun factory is ready to manufacture them; and a design for this caliber has been completed, which, it is believed, is free from the serious defects that have caused the failure of many foreign guns of the largest caliber.

Close study and observation of the mounts for main batteries in use abroad have enabled the Ordnance Bureau to provide materially improved carriages for the batteries of the new ships. For the 8-inch guns gravity-return carriages, fitted for working by hand, have been decided upon, giving a great gain in simplicity of design, and a saving in weight.

The supply of guns for the secondary batteries is making rapid progress. The Hotchkiss Company, having completed the one hundred and twenty guns previously ordered, has been given further orders for fifty 6-pounders of increased length, and twenty-five 1-pounders of the latest type.

The first of the Driggs-Schroeder 6-pounders having been delivered and successfully tested, a further order for seventy-five of these guns was given to the Driggs Ordnance Company. Rapid progress is being made with the carriages, those for guns of various descriptions being

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made interchangeable as far as possible. The system of recoil mounts for rapid-fire guns has proved a complete success in practice, and has shown itself equally applicable to all guns of this system.

The progress of machine guns is being carefully watched, and a trial will shortly be given to the recently improved Gatling gun.

In small arms the Navy Department is only waiting for the decision of the War Department upon the dimensions of cartridge to be adopted for use by the Army. It is highly important that small-arm ammunition for the two services should be interchangeable, and the acquisition of suitable small arms will be begun as soon as this question is settled.

POWDER AND HIGH EXPLOSIVES.

The brown powder for general service use in heavy guns continues to give excellent results.

The most important advance made during the past year in respect to powder consists in the development of a smokeless powder, invented by Prof. C. E. Monroe of the Naval Torpedo Station. The results have exceeded the anticipations formed in reference to this powder. Its successful use has advanced by progressive experiments from the 1, 3, and 6-pounder guns up to the 4-inch rapid-fire gun. In reference to the results accomplished, it is only necessary to say that with charges one-half the weight of those used with ordinary powders, the velocities have been increased nearly 200 foot-seconds, with no increase of chamber pressure. In other respects the powder gives singular satisfaction. It contains no volatile constituents, is not affected by repeated heating for long periods, is uninjured even by boiling in water, gives high and regular velocities with moderate and regular pressures, and thus far has shown all the essential requisites of a normal smokeless powder. It is safe to say that within a short time the use of ordinary gunpowder will be abandoned in calibers of 6-inch and below.

The great value and importance of gun-cotton for naval purposes, and the certainty that the restricted facilities for its manufacture would be a source of great embarrassment in case of war, has led the Department to consider their extension. To this end an offer of an order for 50,000 pounds of gun-cotton was made to Messrs. Dupont, of Wilmington, contingently upon the establishment of a complete plant for its production. The offer was accepted, and within two months the new plant will be in condition to turn out 1,000 pounds of gun-cotton per day. At the same time the capacities of the gun-cotton factory at the torpedo station have been enlarged, and it may be said that in this respect the resources of the Government are now ample.

In Emmensite it is believed that a high explosive has been obtained, which, while as powerful as gun-cotton, can be detonated by a fuse of less sensitive composition than the fulminate fuse required with the latter substance. Experiments during the past year have led to this conclusion, and have resulted in the production of a fuse composition

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which, while insensitive to shock and percussion, will, when simply ignited, explode emmensite with an effect approaching detonation. In an experiment made at the proving ground an 8-inch shell containing 3 pounds of emmensite was exploded by this means and shattered so completely that over 300 fragments were found. Experiments are also in progress to determine the feasibility of firing shells containing large quantities of high explosives from a mortar, and it is believed that these will result in showing the practicability of discharging a high explosive projectile from a powder gun with safety, and exploding it upon impact with certainty. Like other experiments now making in ordnance, the possibilities of these investigations are far-reaching and point to extraordinary developments in the near future.

PROJECTILES.

Until the present year the United States has been entirely destitute of any armor-piercing projectiles. It was stated in the last report that a contract had been made for a quantity of armor-piercing shell manufactured in America by one of the foreign processes. All the 6-inch and about one-half of the 8-inch shell under that contract have been delivered and have passed the required tests, and are now issued to ships as required. The Carpenter Steel Company, the firm which is manufacturing these projectiles, has made gradual departures from the original designs, which have resulted in distinct improvements; and the difference in the effective force of the Navy to-day as compared with its situation a year ago, when it had not a single projectile that could pierce modern armor, is incalculable. It may be added that this change, little more than a revolution, by which we may obtain in America all the armor-piercing shell that we need, has been brought about at very moderate expenditure.

The production of cast iron common shell and shrapnel has continued at the gun factory at a considerably reduced cost. The hopes held out in the last report of the establishment in the United States of a new process of manufacturing forged steel shell have been realized, and a contract has been made with the United States Projectile Company, of Brooklyn, N. Y., for shell of this description for the 4-inch, 5-inch, and 6-inch guns. A quantity of projectiles made by an electric-welding process has also been ordered from the American Projectile Company, of Boston, Mass., and efforts are being made at the same time to domesticate other processes in this country.

TORPEDOES.

The manifest importance of the proper development of torpedoes has induced the Department to put this subject under the special charge of a Torpedo Board, under the Bureau of Ordnance. Questions regarding the installation and proper disposition of torpedoes are being rapidly

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settled by the Board, and the practical knowledge of this subject has been materially advanced. In the report of last year the fact was stated that the Navy was absolutely destitute of any automobile torpedo, but strenuous efforts have been made to remedy this vital defect, and have resulted in the establishment, by the E. W. Bliss Co., of Brooklyn, N. Y., of a plant for the manufacture of Whitehead torpedoes in this country. The contract was entered into in May last, for one hundred 18-inch torpedoes of the most recent type. The first torpedo is to be ready for trial in a few days, and if found satisfactory, the remainder are to be delivered at the rate of one hundred per month. The successful domestication in this country of the manufacture of the Whitehead torpedo is one of the most important advances in naval development that has been made for several years.

The delays in the completion of the Howell torpedo were fully referred to in the last annual report. Successful experiments with this torpedo will, it is hoped, shortly be made, and the Hall torpedo, constructed at the torpedo station, is approaching completion. The three Patrick torpedoes ordered three years ago have now been delivered.

Important work has been done in the preparation of launching tubes, and other details connected with the use of torpedoes, and the present state of the work is such as to justify the belief that the torpedo outfits may be installed on board our vessels within a short period, and that the torpedo equipments of our new navy will soon equal, if not surpass, those possessed by other nations.

The contract made in 1890 with the Ericsson Coast Defense Company for one 16-inch submarine gun and its projectiles having been greatly delayed, the work has been undertaken at the Washington Gun Factory, the expense to be borne by the contractors. It seems probable that this gun will prove an important adjunct to our defensive armament.

Active investigation has been made of the subject of torpedo defense nets, and portions of such nets, one made in America and the other of the most approved foreign type, have been procured with a view to testing them as soon as the Ericsson submarine gun is available for the purpose. The test will determine which of the two is the most successful, and will lead to the acquisition of another essential instrument of naval operations, which, up to this time, has been entirely wanting.

The *Stiletto* has been placed in a serviceable condition by the installation of a new boiler, and a launching tube is now mounted on deck for the trial of the Howell torpedo. She is therefore now a serviceable second-class boat. Plans have also been prepared for mounting tubes on board the *Cushing*.

The progress made abroad in the construction of submarine boats has been carefully watched, and it is believed that recent developments in the applications of electricity have greatly simplified the problem and point to the expediency of constructing such a boat in the near future.

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VESUVIUS TRIALS.

Under date of May 13, 1891, a board of officers, of which Commander R. D. Evans was senior member, was appointed by the Department to determine the following points in regard to the *Vesuvius* and her guns:

(1) The accuracy of fire at different ranges under favorable conditions.

(2) The readiness with which the range can be altered.

(3) The effect of a slight and of a moderate sea and wind.

(4) The general efficiency of the guns and of the vessel as a platform.

(5) The actual efficiency of the vessel for offensive purposes.

After a trial lasting for three days, during which two of the vessel's 3 guns were used, the Board reported its conclusions as follows:

The accuracy of fire of the starboard gun under the conditions we consider good; that of the middle and port guns we are unable to criticise, because the valves were not in satisfactory working order. The valve of the starboard gun has been modified by Lieut. Seaton Schroeder, and worked satisfactorily throughout. The range can be very readily altered, the setting of the valves can be changed to any point from extreme to shortest range in five seconds. The effect of a moderate sea and wind on the general efficiency of the guns and their range is very slight. Generally speaking the vessel as a gun platform behaved very satisfactorily. There are many details concerning the steering gear and conning tower which could be very much improved. As to the actual efficiency of the vessel for offensive purposes, the board has little data on which to base an opinion.

On May 20 three shots were fired at a target towed by the *Cushing* at a speed of 10 knots across the line of fire, the *Vesuvius* steaming 17 knots; one of these would undoubtedly have struck a vessel. This the Board considers a favorable showing under the circumstances. The Board considers that the fittings and appliances for loading and firing these guns as fitted are very crude and capable of great improvement. The Board would recommend that the guns should be carefully ranged in some suitable locality where the fall of the projectiles can be accurately determined from shore stations, that some simple and suitable sight should be fitted, and such changes made in the mechanism for loading and firing the guns as may be found advisable, and that the vessel be then subjected to such further tests as will fully determine her efficiency as a torpedo thrower.

In accordance with the recommendation of the Board, a further test of the *Vesuvius* was decided upon, and the Board was directed to draw up a programme therefor. The trial will take place as soon as the Dynamite Gun Company can furnish the necessary projectiles.

ORDNANCE ESTABLISHMENTS.

The development of the gun factory has continued during the year and many improvements have been made in the appliances. The new 110-ton crane has been completed and is in operation. Additional machine tools for small work, a well equipped chemical laboratory, new machinery for the manufacture of breech mechanism and the mounts for rapid-fire guns, and new gun lathes have increased materially the efficiency of the shops. An important improvement has been made by

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the adoption of the system of heated air in assembling guns. A furnace has also been erected for treating armor plates by the Harvey process. The results accomplished in the gun factory, both in the character of the work done and in its economy, have justly given it the reputation all over the world of a model establishment, and the experience obtained by the officers who have been on duty at the factory is productive of incalculable benefit to the service.

The growing demands for the naval defense of the Pacific coast, and the great expense entailed by transportation of heavy ordnance freights across the continent, point to the absolute necessity of establishing in the near future an ordnance factory at some point in that neighborhood. Such an establishment should be under the general control of the War Department and the Navy Department, and should do the work of both. The work of the Washington gun factory shows what experience and intelligence can accomplish in this direction, and if Congress should adopt the measure the Navy can furnish the men to carry it out. There is no reason why such an establishment should not duplicate the success which has been achieved at Washington.

The development of the new proving ground at Indian Head will enable the Department shortly to discontinue the use of the old site near Annapolis. The improvements that have been made in the new ground are fully described in the report of the Chief of the Bureau of Ordnance, and the establishment is now in thorough working order. It is highly desirable, in view of the remoteness of the grounds at Indian Head and its want of mail communications, that a special telegraphic wire should be laid between it and the Navy Department.

The naval magazine to replace that abandoned on Ellis Island has been established near Dover, N. J., in the reservation controlled by the Ordnance Department of the Army. The necessary structures are being erected, and the place will become the principal naval storehouse for powder and high explosives on the Atlantic coast.

SHIPS IN COMMISSION.

The past twelve months have given the vessels of the Navy more active employment than they have seen for many years. Especially in the Pacific the demands on the fleet have been numerous and constant.

The North Atlantic squadron, under the command of Rear-Admiral Bancroft Gherardi, consists of the *Philadelphia*, *Miantonomoh*, *Concord*, *Kearsarge*, and *Vesuvius*. The squadron made its usual stay during the winter and the spring in the West Indies and returned during the summer to northern waters, extending its cruise to the eastward as far as Halifax and taking part, in connection with the squadron of evolution, in tactical drills and a naval review in August last. The *Miantonomoh* is now completing her preparations for sea and the *Vesuvius* will shortly undergo a second trial to test the efficiency of her dyna-

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mite guns. The other ships of the squadron, consisting of the *Philadelphia*, *Concord*, and *Kearsarge*, have resumed their cruising duty in the West Indies.

The South Atlantic squadron at the date of the last report was under the command of Acting Rear-Admiral William P. McCann, and was composed of the *Pensacola*, *Essex*, and *Tallapoosa*. On the breaking out of the Chilean revolution, in January last, the *Pensacola* was withdrawn for service in the Pacific. Admiral Brown being then at Honolulu, Admiral McCann, in addition to his previous duties, was placed in command of that part of the Pacific station embracing the west coast of South America south of Callao. The *Pensacola* subsequently proceeded to San Francisco. The *Tallapoosa* has also ceased to form part of the squadron, having been condemned and ordered to be sold on the station. In October last, the *Yantic* was ordered to join the squadron. In view of the additional importance recently acquired by this station, the Department has ordered the squadron of evolution to duty in that quarter.

The Pacific squadron, under the command of Acting Rear-Admiral George Brown, consists at the present time of the *San Francisco*, *Baltimore*, *Charleston*, and *Yorktown*, to which the *Boston* will be added on her arrival. Three wooden ships also are attached to this squadron, the *Pensacola*, *Mohican*, and *Iroquois*. The *Baltimore* and *Yorktown* are at Valparaiso, and the *San Francisco* has just been docked at Mare Island. In view of the threatening aspect of affairs in China, the *Charleston*, on August 10, was temporarily detached for service on the Asiatic coast, but she is now returning to her station. The *Pensacola* has remained at Honolulu since her arrival, September 25, and the *Iroquois*, since August 6, has been in service at Samoa.

The enforcement of the *modus vivendi* concluded in June last between the Governments of the United States and Great Britain required the service during the summer in Bering Sea of all the vessels that could be spared. The agreement and the proclamation of the President making it public were signed on the 16th of June. The text of the proclamation was telegraphed to San Francisco and put in type on the afternoon of the same day, and on the next day (the 17th) the *Thetis* sailed for Bering Sea, carrying copies of the proclamation for distribution. She was followed on the 18th by the *Mohican* and *Alert*, and a few days later by the *Marion*. At the close of this duty the *Marion* and *Alert* were ordered to China, and the *Mohican* and *Thetis* returned to San Francisco.

The Asiatic squadron is under the command of Rear-Admiral George E. Belknap, who will shortly be relieved by Rear-Admiral David B. Harmony in the *Lancaster*. The report of the arrival of this vessel is daily expected. The other vessels of the squadron are the *Marion*, *Alert*, *Alliance*, *Monocacy*, and *Palos*. The *Petrel*, which was detached from the North Atlantic squadron on September 9, is on her way to the

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Asiatic station. The condition of affairs in China requires these vessels to be constantly engaged on active duty.

The Squadron of Evolution, under Acting Rear-Admiral J. G. Walker, has continued in active training service, having cruised from January to April in the Gulf, and from May to October on the Atlantic coast. In the Gulf it visited Galveston, New Orleans, and Pensacola, and carried on target practice in Tampa Bay. Small arm practice was obtained at Yorktown on the arrival of the squadron in Hampton Roads.

In July, 1891, the squadron was employed in carrying out a programme of fleet exercises and maneuvers in connection with the naval militia of Massachusetts and New York. This programme included, besides the usual drills and target practice, a torpedo attack upon the fleet and landing drills and engagements on shore. The exercises in addition to the training of the militia, afforded valuable experience to the officers and men of the squadron in the actual use of all the new appliances for combat with which the ships are provided.

Other useful experience has been gained by the squadron, especially in the training of commanding, navigating, and watch officers to maneuver vessels with skill and safety in close formation and in narrow waters, and in the training of engineers to gauge and regulate carefully the speed and coal consumption of their engines. The habitual cruising formation of the squadron has been in column at half distance and its speed ten knots. Special practice has been given in entering and leaving port in this formation. As a test of the training which has been acquired by the officers and men of the squadron it may be mentioned that in September, being then composed of seven ships, it entered the harbor of New York from Long Island Sound, maintaining its formation at half distance and its speed of ten knots through Hell Gate and the East River and past the Battery into the North River to Fiftieth street. Later in the season the crews of the vessels obtained further target practice in Long Island Sound.

The *Pinta* has continued on special duty in Alaskan waters and the *Michigan* on the lakes. The *Fern* is employed as a freight boat at various yards and stations, and the *Thetis* is preparing for surveying duty in the Pacific. The training squadron, consisting of the *Jamestown* and *Portsmouth*, has made the usual cruise in the West Indies and Europe, and the *Monongahela*, which was added last year to the force of training vessels, is now in the Mediterranean, whence she will return to complete her cruise in the West Indies.

ATTACK AT VALPARAISO UPON THE SEAMEN OF THE BALTIMORE.

At 2 p. m. on the 16th of October, the *Baltimore* being then at anchor in the harbor of Valparaiso, a number of seamen belonging to the ship went on shore in uniform for liberty, in accordance with the universal practice prevailing on board ships of war in foreign ports. Two

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weeks had passed since the surrender of Valparaiso to the Congressionalist leaders, and the city was quiet. Other foreign war ships in the harbor had already given liberty to their crews, and no reason existed for withholding a like privilege from the crew of the *Baltimore*.

At 6 p. m. the men had been ashore four hours. It is the general testimony that they had been during this period, and were then, orderly, sober, and well-behaved. The first encounter appears to have taken place at this time between one of the crew of the *Baltimore* and a Chilean, who spat in his face. The sailor knocked the Chilean down and was immediately set upon, with his companion, another of the *Baltimore's* crew, by an angry crowd. The two sailors took refuge in a passing street-car. They were dragged from the car by the crowd. One of them, Petty Officer Charles Riggin, was stabbed, and left to die in the street. His companion, Talbot, an apprentice, escaped, but was afterwards arrested, catgut nippers were put on his wrists, and he was struck again and again by the police on his way to prison.

Another petty officer, Johnson, then in a neighboring house, seeing Riggin lying helpless in the street, went to his assistance. The crowd had now left. Finding Riggin still breathing, Johnson took him in his arms to carry him to a drug store near by. At this moment a squad of Chilean police, with fixed bayonets, came up the street. When at close quarters they fired at Johnson, being so near that his face was blackened by the discharge. One shot entered Riggin's neck and shoulder, inflicting a death wound. Another shot passed through Johnson's clothes.

The affair of the street car was only one of many simultaneous attacks made upon the *Baltimore's* men. The attacks lasted for an hour. They were not confined to one locality, but occurred at several widely separated points in the city. In many instances the American sailors were in restaurants and hotels quietly getting supper when attacked by crowds numbering from 25 to 200 men. The part borne by the police in these attacks is shown by the reports. Thirty-six of the *Baltimore's* men were arrested and taken to prison, being subjected on the way to treatment of the utmost brutality. Catgut nippers were placed on their wrists, and in the case of one man, McWilliams, a lasso was thrown around his neck. Williams, another apprentice, 19 years of age, was arrested by a mounted policeman, who put the nippers around his wrists and then started his horse into a gallop, throwing the boy down. Coal-heaver Quigley, in trying to escape from the mob, was struck with a sword by a police officer. Petty Officer Hamilton was dragged to prison dangerously wounded and unconscious, and his companions, attempting to relieve his sufferings, were threatened with blows from musket butts, and compelled to desist.

Coal-heaver Turnbull received eighteen wounds in the back, two of which penetrated his lungs, and subsequently caused his death. Other men were seriously injured, and several of the wounds were caused by bayonet thrusts, clearly showing the participation of the police. As a

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result of the attacks, two of the men, Riggin and Turnbull, died, and eighteen others were more or less disabled by wounds.

At the examination immediately following the arrest, which was conducted secretly, a request was made of the authorities by Capt. Schley to allow one of his officers to be present in the court. The request was denied. Before the men were discharged they were required to sign a paper in Spanish. A court official, whom one of the men asked what might be the meaning of the paper, declared that it was a mere form, stating that the signer had not been engaged in the trouble.

The sailors during the attack were without arms and therefore defenseless. Of the 36 men arrested and examined, all were discharged, there being no proof of any violation of the peace on their part. The judicial investigation into the conduct of the men failed to show that a single one was found drunk or disorderly. It is clear that their only offense lay in wearing the uniform of the country to which they belonged.

Whether the attacks upon the seamen of the *Baltimore* were preconcerted or not, their real cause can only be found in the bitter hostility of the Chilians towards the United States,—a feeling largely due to the false and malicious accusations which have been put forth at Iquique and later at Valparaiso in reference to the action of the Navy of the United States during the progress of the revolution.

It is due to the Navy to state that so far from having given cause for such a feeling, its conduct, under the instructions of the Department, has in every respect been fair, just, and temperate.

In March, some time after the revolution broke out, and before anything definite could be learned from the meager sources of information at hand as to the relative strength of the contestants and the probability of either party's success, the Navy Department issued instructions to Admiral McCann, and afterwards to Admiral Brown, which are embodied in the following letter:

NAVY DEPARTMENT,
Washington, March 26, 1891.

SIR: When the United States flagship *San Francisco* is ready for sea you will proceed with her to the waters of Chile, South America, relieve Rear-Admiral W. P. McCann of the command of that part of the Pacific Station, and protect American interests. The duty thus imposed upon you calls for the exercise of great discretion. Owing to the stoppage of communication the Department is without authentic details in reference to the condition of affairs in Chile, and you will therefore be compelled to rely chiefly upon your own judgment in the execution of its orders, in view of the facts as you shall ascertain them.

The Chilean minister at Washington has sent the following communication to the Department of State:

"I regret to inform you of a revolt of a division of the navy of the Republic of Chile in the port of Valparaiso on the 7th of this month. My government has declared the revolted squadron outlawed, and instructs me to inform you that it is not answerable for the acts of the rebels in regard to foreigners or citizens."

On the 4th of March the Department sent to Rear-Admiral McCann, by telegraph, the following instructions in cipher:

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Insurgent vessels, although outlawed by Chilean Government, are not pirates, unless committing acts of piracy. Observe strict neutrality. Take no part in troubles further than to protect American interests. Take whatever measures are necessary to prevent injury by insurgent vessels to lives or property of American citizens, including American telegraph cables. Endeavor to delay bombardment by insurgents until American citizens and property are removed, using force, if necessary, only as a last resort, and when serious injury is threatened. American vessels seized by the insurgents without satisfactory compensation are liable to be recovered forcibly, but you should investigate matter fully before taking extreme measures, and use every precaution to avoid such measures if possible.

As a further and more explicit guide for your action you are directed:

(1) To abstain from any proceedings which shall be in the nature of assistance to either party in the present disturbance, or from which sympathy with either party could be inferred.

(2) In reference to the ships which have been declared outlawed by the Chilean Government, if such ships attempt to commit injuries or depredations upon the persons or property of Americans, you are authorized and directed to interfere in whatever way may be deemed necessary to prevent such acts; but you are not to interfere except for the protection of the lives or property of American citizens.

(3) Vessels or other property belonging to our citizens which may have been seized by the insurgents upon the high seas, and for which no just settlement or compensation has been made, are liable to forcible recovery; but the facts should be ascertained before proceeding to extreme measures, and all effort made to avoid such measures.

(4) Should the bombardment of any place by which the lives or property of Americans may be endangered be attempted or threatened by such ships, you will, if and when your force is sufficient for the purpose, require them to refrain from bombarding the place until sufficient time has been allowed for placing American life and property in safety.

You will enforce this demand if it is refused, and if it is granted, proceed to give effect to the measures necessary for the security of such life or property.

(5) In reference to the granting of asylum, your ships will not of course be made a refuge for criminals.

In the case of persons other than criminals, they will afford shelter wherever it may be needed, to Americans first of all, and to others, including political refugees, as far as the claims of humanity may require and the service upon which you are engaged will permit.

The obligation to receive political refugees and to afford them an asylum is, in general, one of pure humanity. It should not be continued beyond the urgent necessities of the situation, and should in no case become the means whereby the plans of contending factions or their leaders are facilitated. You are not to invite or encourage such refugees to come on board your ship, but, should they apply to you, your action will be governed by considerations of humanity and the exigencies of the service upon which you are engaged. When, however, a political refugee has embarked, in the territory of a third power, on board an American ship as a passenger for purposes of innocent transit, and it appears upon the entry of such ship into the territorial waters that his life is in danger, it is your duty to extend to him an offer of asylum.

(6) Referring to paragraph 18, page 137, of the Navy Regulations of 1876, which is as follows:

"If any vessel shall be taken acting as a vessel of war or a privateer without having proper commission so to act, the officers and crew shall be considered as pirates, and treated accordingly;"

you are informed that this paragraph does not refer to vessels acting in the interests of insurgents and directing their hostilities solely against the State whose

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authority they have disputed. It is only when such vessels commit piratical acts that they are to be treated as pirates; and unless their acts are of such a character, or are directed against the persons or property of Americans, you are not authorized to interfere with them.

(7) In all cases where it becomes necessary to take forcible measures, force will only be used as a last resort, and then only to the extent which is necessary to effect the object in view.

The U. S. S. *Baltimore*, now en route to the Pacific, is assigned to duty on the station under your command.

Very respectfully,

B. F. TRACY,
Secretary of the Navy.

Rear Admiral GEORGE BROWN, U. S. N.,
U. S. Flagship San Francisco,
Navy-yard, Mare Island, Cal.

The instructions quoted above, which were prepared in the Navy Department and carefully considered by the Cabinet, show conclusively that the Navy was directed to preserve, in reference to the Chilean controversy, an attitude of absolute fairness and impartiality. So strongly did this disposition prevail among the officers themselves that before these instructions were issued Admiral McCann had already, in February, upon his arrival on the station, published a general order, enjoining the officers and men under his command to maintain the strictest neutrality, "to abstain from discussing or criticising the present unfortunate state of affairs in Chile, and in no way to express any sentiments or opinions, either favorable or unfavorable, to either side."

With such a spirit animating the commander-in-chief, there is no doubt that the instructions of the Department were carried out to the letter. In these instructions the implied assumption by the Chilian Government that the insurgent vessels should be regarded as outlaws was repudiated. Strict neutrality was commanded. So careful was the Department to prevent any erroneous conclusions that might be drawn by officers as to the character of these vessels that it expressly revised and corrected its regulation for the treatment of ships of war acting without a regular commission.

The first distinct cause of hostile feeling was the affair of the *Itata*. This vessel was a transport belonging to the congressionalist party. Having been seized at San Diego for an alleged violation of our neutrality laws, she had broken her arrest and put to sea, placing an armed guard over the United States deputy marshal who had been left in charge of the vessel. He was thus held a prisoner until put ashore 8 miles from the anchorage.

The act of the *Itata* in forcibly removing herself from the legal and actual possession and custody of the United States led the Navy Department, upon receiving information of the facts from the Department of Justice, to order the *Charleston*, then at San Francisco, to proceed at the earliest moment in search of the *Itata*, to seize her if found upon the high seas, and to restore her to the jurisdiction of the court. The

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order was issued on the 8th of May, and the *Charleston* left San Francisco a few hours after.

At the date of this occurrence Admiral Brown, in the flag-ship *San Francisco*, was at Iquique, the seat of the provisional government. Upon hearing of the high-handed proceedings of the *Itata*, Señor Errazuriz, secretary of foreign relations of the council, on May 13, five days after the occurrence, wrote the following letter to Admiral Brown:

IQUIQUE, *May* 13, 1891.

ESTEEMED SIR: The provisional government has learned by the cablegrams of the Associated Press that the transport *Itata*, detained in San Diego by order of the Government of the United States for taking on board munitions of war, and in the possession of the marshal, left the port carrying on board this official, who was landed at a point near the coast, and then continued her voyage. The Government has learned directly nothing more of the acts of the *Itata* since she left San Diego.

If this news be correct this government would deplore the conduct of the *Itata*, and, as an evidence that it is not disposed to support or agree to the infraction of the laws of the United States, the undersigned takes advantage of the personal relations you have been good enough to maintain with him since your arrival in this port to declare to you that as soon as she is within reach of our orders his government will put the *Itata*, with the arms and munitions she took on board in San Diego, at the disposal of the United States as you may direct, through the worthy agency of yourself, in order that the laws of your nation may follow their course interrupted in San Diego.

I have the honor to subscribe myself, the secretary of foreign relations of the provisional councils of government,

ISIDORO ERRAZURIZ.

The offer made by Señor Errazuriz in the above letter was absolutely voluntary. It was thus the Iquique Government itself, which, within five days of the occurrence, disavowed the act of the *Itata*, and stated its intention to put her, with the arms that she had taken on board, at the disposition of the United States. A want of clearness in reference to the arms to be restored led to a brief correspondence, and, as soon as this point was settled, no time was lost by the Navy Department in revoking the *Charleston's* orders. A message from Admiral Brown to Señor Errazuriz expressed the gratification of the United States Government at learning that those for whom the *Itata* acted disapproved of her conduct.

The *Itata* arrived at the Chilean port of Tocopilla on June 3, and proceeded to Iquique, and, in fulfillment of the voluntary promise made by Señor Errazuriz, sailed on June 13 for San Diego, with the *Charleston* in company, both vessels arriving on the 4th of July.

The next incident which seems to have excited a feeling of ill-will in the minds of the Chileans was the junction of the ends of the submarine cable outside of Iquique. Application had been made by the representative of the Central and South American Telegraph Company, an American corporation, to the authorities of that place, requesting that the company's new cable extending to Valparaiso might be permitted to be opened, and that the northern and southern sections of the cable might be joined in the neighborhood of Iquique.

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Permission to open through communication having been denied, the company employed the steamer *Relay*, an American vessel, to pick up and connect by a loop outside of the territorial waters the northern and southern sections of its cable. The act was performed in the open sea outside of Chilean territory. It was the lawful act of a private American company performed through the agency of a private American steamer. The U. S. S. *Baltimore* was present when the act took place. Her presence was not due to any specific order of the Department, no orders having been given upon this subject other than the general instructions of the 4th March, the provisions of which are as follows:

Take whatever measures are necessary to prevent injury by insurgent vessels to lives or property of American citizens, including American telegraph cables.

The act was in no way the act of the United States Government, but it was the act of the cable company in the execution of its lawful right to protect and make available for use its own property.

The only other incident of importance in which the Navy has taken part was the visit of Admiral Brown to Quinteros Bay on the occasion of the landing of the revolutionary troops for their campaign against Valparaiso. How little there was in this incident to justify the extraordinary assertions that have been made in regard to it appears from the following report of Admiral Brown, now published for the first time, which gives a full description of the affair:

U. S. FLAGSHIP SAN FRANCISCO, NOVEMBER 14, 1891.
At Sea, Lat. 27° N., Long. 114° 22' W.

Hon. SECRETARY OF THE NAVY,
Navy Department, Washington, D. C.

SIR: On the 10th instant, at 3 p. m., when this ship was under way and steaming out of the harbor of Acapulco, Mexico, I received a cipher dispatch, the following being the translation of the same:

"Did you invite any Chilean officers to accompany you on board the *San Francisco* to witness the landing of Chileans at Quinteros? Did you or any of the officers or your crew, on return on that occasion to Valparaiso, Chile, communicate information about what you saw to any person not connected with your vessel?

"TRACY."

To the above message I replied:

"Did not invite or take any Chileans. I invited foreign officers. Only German went. No one from this ship gave information. Full information about landing was known at Santiago and Valparaiso before I sailed at noon.

"BROWN."

Before I left Valparaiso there were published and discussed many misrepresentations and falsifications bearing on my going to Quinteros, which I am satisfied emanated from the large English Colony at Valparaiso as a part of their preconcerted plans for injuring all Americans in a commercial sense, as also to sustain and strengthen their well-known position with the many sympathizers with the Insurgents.

The subject was freely discussed by them during the time the insurgents were investing Valparaiso, and as soon as the city fell into their hands and Congressionalist papers which had all been suppressed by the Government, began to be issued,

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the subject was occasionally referred to. I was called a "spy," etc., by them. To all this I paid no attention, except on two occasions, to which I will refer later on.

As explanatory to my telegram from Acapulco, I consider it proper that I should place on record the following detailed statement in connection with the subject referred to.

At 9:30 a. m., on August 20, I went on shore and, when near the intendencia, met Maj. Herara, of Vice-Admiral Viel's staff, who speaks English perfectly. On asking if there was any news, he replied that the opposition had landed in force at Quinteros at daylight, and that this fact was known to everybody.

To verify this statement, I went immediately to the office of Vice-Admiral Viel, intendente of Valparaiso, and on meeting him he informed me that it was true that a landing had been made at Quinteros, and that he had informed the President. He gave me the names of all the ships of war, transports, and tugs, and said that about ten thousand men were in the expedition. I asked him if he was sure that a landing had been effected. He then detailed to me the facts that at early daylight that morning he had received a telephone message from the observer at the Valparaiso lighthouse reporting that a large number of vessels were entering Quinteros Harbor. Soon after this, and before 7 o'clock, he received a telegraphic message from the operator at Quinteros stating that the opposition were landing a large force, and giving the names of armed vessels, transports, and tugs, and saying that the operator would move his instrument back to a safe point about 3 miles distant, and when connected would report further.

At about 8 o'clock, the operator reported that the advance of the insurgent force was within a mile of his station, and that he would abandon it at once. At 9 o'clock (a half hour before I had this interview with Viel) he had received a report from Vina del Mar, stating that the enemy was in sight on the high lands on the north bank of the Aconcagua River.

I asked the Admiral what the Government was going to do to oppose the advance of the insurgents. He said that the Government forces had advanced, and that fighting would probably take place to the north of the Aconcagua River; that the insurgents would be attacked and driven back to their ships at Quinteros. He allowed me to look at the maps, and pointed out the location of the insurgents at that time, and the routes which the Government troops would take. I then asked Admiral Viel if this information was to be considered confidential, and he said "No, it is known to every man, woman, and child in Valparaiso and Santiago." (This statement of Admiral Viel was subsequently, at my request, repeated by him in the cabin of the German flagship *Leipzig*, in the presence of Rear-Admiral Valois of the German navy, and Capt. Sampson of this ship.)

I left the Intendencia and walked several squares along the principal street; returned to my boat, and came on board shortly after 10 o'clock. On the street and in the plaza I met several acquaintances, including the United States consul, Col. McCreary, and by everyone was told of the landing at Quinteros. As I neared the landing long lines of railroad cars were being loaded with troops, and some trains had started for Vina del Mar.

On coming on board I sent an officer to the German and French admirals and to the senior English naval officer, and informed them that I would get under way about noon, go to the vicinity of Quinteros and return that evening, and that I would be happy to take any officers with me.

They all knew of the landing having been made. Only one officer, a German lieutenant, came on board to accompany me, and he was the only person who went to Quinteros with me who did not belong to this ship.

I never even intimated that I would take a Chilean with me, and most certainly would have declined to do so had any one of that nationality applied.

We got under way a few minutes after noon (the engine-room log showing that the engines were started ahead at 12:03 p. m.) and steamed to Quinteros, a distance of 18

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miles. We made a turn around the bay and returned to Valparaiso, where we anchored at 4:50 p. m.

Both going and returning, we passed two of the insurgent ships, which were under way and evidently on picket duty, and which were in sight from Valparaiso. I did not communicate with these ships nor with any one at Quinteros, because I knew if I did so that it would be said in Valparaiso that I had given information to the Congressionalists.

While returning from Quinteros, I had cipher messages gotten ready for the Department and for Capt. Schley of the *Baltimore*, who was then at Coquimbo. My message to you reported the landing at Quinteros; that to Capt. Schley ordered him to proceed to Valparaiso with dispatch. These messages were taken on shore by an officer as soon as we anchored (he reached the landing at about 5.10 p. m.), and he had to go to Admiral Viel to have my message to you viséd by him and to get him to send the one for Capt. Schley by the government land line, which was then the only means of telegraphic communication with Coquimbo. My cablegram to you had to be viséd by the intendente, as the government agent at the cable office would permit no messages sent that had not received the "visto bueno" of the intendente.

The officer returned on board very promptly, and gave me additional information of the movements of the two opposing armies, and by far more than any one on board of this ship could have imparted, as all we knew was that the insurgents had landed and that the great majority of them had advanced towards the Aconcagua River, which is just 12 miles from Quinteros, and which the main body must have reached before we anchored at Valparaiso, as ten hours had elapsed since their landing.

When in Santiago, on the 10th of September, I was told by our minister, Mr. Egan, Col. Spooner, and Mr. Demorest, that before 11 o'clock on the forenoon of August 20 (the day of the landing) they knew of the landing, and that it was known to everybody on the streets.

The two occasions on which I referred to the abusive and utterly false accusations, which were repeated in the English clubs and mentioned in the papers, were, first, when I called on Admiral Montt, President of the Junta Government, at Valparaiso, on the afternoon of August 29, the day after the fall of the city, when I told him of the remarks that had been made by people in Valparaiso about my going to Quinteros. I told him what I had learned before starting, and of all the information I had obtained, and was particular in explaining to him and impressing on him that what I told him was not in any way to be considered in the light of an apology, but only in order that he should be in possession of all the facts.

The second occasion of my referring to this subject was on September 6, in a personal letter to our minister at Santiago, Mr. Egan, in reply to a personal note from him of the day previous. I replied at once in a personal letter to Mr. Egan, and gave him in substance the facts I have stated above relative to my trip to Quinteros.

My letter was published in several of the Santiago papers (which are generally read in Valparaiso); but that part of my letter which stated that I informed Admiral Montt that I had done nothing to apologize for was left out.

In this connection I would state that during the time this ship and the *Baltimore* were in Chilean waters no official act or word on the part of any officer or man of the two ships could possibly have been construed as being in any way other than in the line of the strictest neutrality.

I here state most emphatically that any report, no matter by whom made, relative to my visit to Quinteros Bay on the 20th of August last, which differs from the above statement, is an absolute falsehood, deliberately fabricated for the single purpose of discrediting American interests in Chile.

Very respectfully, your obedient servant,

GEO. BROWN,
Rear-Admiral U. S. Navy,
Commanding U. S. Naval Force, Pacific Station.

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It therefore appears that neither in the affair of the *Itata*, whose surrender was voluntarily determined on by the provisional government at Iquique, nor in the presence of the *Baltimore* when the agents of an American cable company spliced their cables on the open sea, nor in the visit of Admiral Brown to Quinteros Bay was there any ground of offense given by the Navy of the United States to any person, party, or government then existing in Chile, nor was any assistance or encouragement of any kind rendered to what was at that time recognized by all the world as in fact the government of the country. Yet it is impossible to account for the series of outrages perpetrated on the crew of the *Baltimore* on any other supposition than that those who concerted them were influenced by the calumnies which had been actively circulated, and that they were aided and abetted by a police guard which should have suppressed them. No charge or even suspicion of misconduct attaches to the men who, on the night of the 16th of October, endeavoring without weapons to defend themselves against an armed attack, were driven by the police to a Chilean prison because they wore the uniform of American sailors.

INCREASE OF THE NAVY.

The old wooden ships of the Navy have now practically passed out of existence. They no longer count even as a nominal factor in naval defense. The sole reliance of the United States to-day for the protection of its exposed seaboard is the new fleet. This has advanced slowly, but its development has been sure. It is a novel branch of industry, but there have been no failures thus far, and the outlook for the ships still in progress is satisfactory. It may fairly be claimed for the work of reconstruction in the future that it will not fall behind the measure of success attained up to the present time.

The course of events during the past year has shown anew the necessity of continuing the development of the Navy. The demands upon it have been constant, and they are constantly growing. The rapid extension of commercial relations has doubled the importance of our interests, especially in the Pacific. It was said a few years ago by a keen foreign observer: "Some day or other there will be a great rivalry of three or four nations in the Pacific for the commerce of those seas, and the country which has cultivated its strength with a view to that contingency will carry off a chief part of the prize." The rivalry has already begun, and the signs are evident on every hand of sharp competition.

It is apparent that the mercantile competitors of this country are to-day enlarging their fields of activity with a more aggressive energy than ever before. No one can fail to observe the indications of a systematic effort to take advantage of the disturbed conditions now prevailing in many of the smaller states. In this movement naval ascendency plays a large part. The consequences are not far to seek. The estab-

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lishment of complete commercial supremacy by a European power in any state of the Western Hemisphere means the exclusion of American influence and the virtual destruction, as far as that state is concerned, of independent existence. With the great maritime powers it is only a step from commercial control to territorial control.

If that most important agency in the commercial development of the United States, the Nicaragua Canal, were completed, the strategic situation would be largely modified. At the present time the two seaboards are so remote that each requires its separate system of naval defense. Each has its vulnerable points, and each has neighbors that are well prepared for offensive movements. There is a circle of insular fortresses facing our Atlantic seaboard, the sole object of whose existence is to maintain naval outposts at our doors. There are States in the Pacific, and not large States either, whose fleets are more powerful than any force that we could readily bring to meet them. To protect either seaboard, even when our present authorized fleet is completed, will involve stripping the other at a critical moment.

I believe that public opinion in the United States desires to see this country provided with an efficient naval protection. The press, which represents the best intelligence of the country, speaks on the subject with clearness and emphasis. It believes, and the country believes with it, that this protection is an obligation upon the national government. It does not believe that cities like San Francisco, Seattle, and Tacoma should be open to the attacks of a third-rate power, whose ships, by a sudden movement, may enforce contributions that would pay in advance the expense of a war. If anyone believes that such rapidity of movement is impossible, let him recall the circumstances under which the *Esmeralda* appeared in April last, without warning, close to the Californian coast, sending on the *Itata* to San Diego. As little does public opinion believe that the commercial seaports of the Gulf and the Atlantic should be unprotected from attack by any nation whose fortified harbors and fully-equipped naval dockyards are within forty-eight hours' steaming.

But it is not the seacoast States alone that have a direct interest in naval efficiency. The prosperity of the whole interior depends upon the uninterrupted supply of the demands of a foreign market. If, when war comes, we are not in a position to protect the transportation of our food products, the foreign market will be closed. By the blockade of such great outlets as Galveston, New Orleans, and Mobile in the Gulf, and the Chesapeake and Delaware and New York on the Atlantic, the great industry of the interior will be paralyzed.

It was well said by a former Secretary of the Navy, Hon. J. C. Dobbin, of North Carolina, as long ago as 1854:

> But who are interested in the Navy? It is not merely the citizen whose lot is cast along the coast, the wealthy merchant in our cities, the speculator in floating merchandise, but merchants, mechanics, planters, our countrymen all along the coast,

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up our rivers, beyond our mountains. The agricultural interest is as much benefited and protected by the Navy as any other. Every planter in every section is not more truly protected by the inclosure around his farm than by our "wooden walls" which float around our coast.

But it is repeatedly said that the United States should avoid war. This is a proposition to which every right-minded citizen must assent. No principle is more firmly established in our national policy, and the Federal officer who would involve this country in a causeless war would be a traitor to his trust. But war does not require the agreement of both parties; it may come upon us without our consent, and even against our will. If a hostile fleet should attack San Francisco to-morrow, war would exist as a fact, although it had not been declared by legislative enactment.

Even if it were impossible to involve this country in war without its consent there are situations in which that consent would be given by a unanimous popular voice. There are outrages which can not go unredressed; there are injuries to which no nation can afford to submit. Against such injuries the surest preventive is a strong national defense. To refer again to the words of the statesman whom I have just quoted:

Weakness invites aggression, and never inspires respect; while acknowledged strength and visible preparation command consideration, and are the true safeguards of peace.

There are elements of danger at all times for American interests, and at any moment these elements may be rendered tenfold more active by a European war.

Our situation as a commercial neutral between these mighty contestants, to some of whom our exports of beef and pork and grain and cotton will be a necessity, while to others they will become a main object of attack, is one for which we must make an adequate provision beforehand. The disastrous consequences of our position in 1805–1812, as an unarmed neutral between two unscrupulous belligerents, are well known. The direct losses alone, to say nothing of the indirect injuries, sustained by our merchants during that period amounted to a sum that would have built a navy sufficient to have swept the ships of either one of our aggressors from the ocean. As was stated by the President of the United States more than fifty years ago—

The history of the late wars in Europe furnishes a complete demonstration that no system of conduct, however correct in principle, can protect neutral powers from injury from any party; that a defenseless position and a distinguished love of peace are the surest invitations to war; and that there is no way to avoid it other than by being always prepared and willing, for a just cause, to meet it.

At the last session of Congress the construction was authorized of only one new ship, Cruiser No. 13. Allowing for the delays that usually occur, this ship will probably be ready for commission in about two years. The last of the other ships now under construction will probably be finished at about the same time, unless delayed by the want of

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armor. The building operations of the Navy under existing statutes will then come to an end, unless new constructions are authorized at the present session.

The progress of construction during the last eight years has clearly shown the necessity of early authorization. Although the preparations for the construction of No. 13 were hastened to an extraordinary degree, it was six months after the passage of the act before the preliminary work was fairly begun. In the case of the other new vessels built or building, the average time has been about one year and, omitting the *Indiana* and her consorts and Cruiser No. 12, it has been nearly a year and a half. The work of design and calculation necessarily takes a considerable time, and any authority given at the present session of Congress, could hardly reach the point of effectual commencement of work before the spring of 1893.

The estimates for increase of the Navy for the coming year, including hull, machinery, armor, armament, and equipment, show a reduction of $5,300,000 below the appropriations for the current year, or $12,300,000 in place of $17,600,000. A much larger reduction will take place in the following year, which will substantially complete all the work in progress under existing authorizations of Congress. In view of the large reduction in current estimates, and the still larger reductions in the immediate future, it would seem that some new construction might properly and safely be authorized during the present session.

After considering carefully the additions that have been hitherto made to the Navy, and its future necessities, the Department has reached the conclusion that there should be no departure from the policy pursued up to this time of building large armored vessels. Ships of the type of the *Indiana*, now under construction, are undoubtedly the most powerful element of protection that this country can possess.

The main batteries of these ships, which form their most characteristic feature, throw at a single discharge a weight of projectiles of 6,800 pounds, or over 3 tons, with a total energy of 210,000 foot tons; and the energy of the projectile from the 13-inch gun is sufficient to perforate 22 inches of steel at a distance of 1 mile. Their secondary batteries, comprising sixteen 6-pounders and four 1-pounders, discharge 330 projectiles per minute. In addition to her guns, each ship will have torpedo tubes so arranged as to give an all-round fire for the discharge of 18-inch torpedoes, each of which is charged with 250 pounds of a powerful explosive.

It is only by the possession of ships of this type that the defensive strength of the United States can really be measured. We may have many medium-sized cruisers of 4,500 tons or below, which perform useful service in time of peace in carrying the flag about the world, which give practical training to officers and men, and which perform important auxiliary service in war. But when opposed to armored ships these vessels can not be counted as an element of force. If it is conceded that

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we require a navy strong enough to resist an attack of any state possessing two modern sea-going armored vessels—and there are many such states that in every other respect are far behind this country—we must have a sufficient number of ships of this type ready to meet them upon either coast. Three such ships, the number that we have provided for up to the present time, are not enough to fulfill even this moderate requirement.

The success which has attended the development of the plans of the three ships of this type, now in process of construction, and the favorable recognition which the designs have universally received, both in this country and in Europe, justify the Department in urging that naval construction should continue upon substantially the same line. The efficiency of the type is beyond question. The cost of the ships, although considerable, is not great for the service they render. It would certainly be poor economy to build in their place second-class armored vessels of the type of the *Maine* and the *Texas*, for example, which, though excellent ships for their size, are not large enough to accomplish the true object of a heavily armored vessel.

One first-class ship would cost certainly one-fifth less than two of the smaller type, and yet have a comparative force so much greater that in an engagement *it would destroy them both without receiving material injury.* It is probable also that the cost of the larger ships will be reduced by the increased facilities which experience has given to our American shipbuilders, and by simplified methods in the manufacture of armor, and the Department therefore recommends that authority be given at the coming session to build two new vessels of the *Indiana* class.

The Department also recommends the early construction of a large armored cruiser, similar in general design to the *New York.* This magnificent vessel, whose functions cover a far wider range than those of an ordinary cruiser, presents an extraordinary combination of great coal endurance, high speed, and efficient armor protection. When to this combination is added a main battery of six 8-inch rifles, and twelve heavy rapid-fire guns, she becomes one of the most formidable vessels in our own or any other navy, and one that can be brought into use for any kind of service. With the exception of the three ships of the *Indiana* class, she is the most important element of defensive strength which this country now possesses.

The tendency of naval construction all over the world, at the present time, in the matter of cruisers, is toward the construction of large vessels. This is caused by the necessity of uniting in a single vessel a battery composed of high-power guns of at least 8-inch caliber, associated with numerous rapid-fire guns; protection in the form of either vertical side armor or a protective deck, or both (as in the *New York*), sufficiently heavy at least to withstand the attack of the rapid fire battery of an adversary; high speed; and, finally, great coal endurance.

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The importance of the latter feature is emphasized by a report received within a week from Admiral Brown on board the flag-ship *San Francisco*. It appears that the actual coal endurance of that vessel, which had been estimated at 8,333 knots will not exceed 4,412 knots with the best quality of coal and a clean bottom. With the same coal, good weather, and a foul bottom the coal endurance is reduced to 3,650 knots. A like result has been experienced in all the English ships of this type.

When it is considered that the distance across the Indian Ocean from the Cape to the Straits of Sunda is 5,000 miles, from San Francisco to Callao is 3,900, and from San Francisco to Yokohama 4,880, the limited range of cruising of such a ship becomes strikingly apparent. In fact, it may be said that were it not for the possibility of breaking the voyage and coaling at the Hawaiian Islands, a vessel of this type could hardly get across the Pacific.

It is impossible to fulfil the four requirements stated above, in a satisfactory manner, on a displacement much below that of the *New York*, and in many recent vessels projected abroad this displacement has been exceeded. To attempt to attain these qualities in a smaller vessel inevitably leads to the sacrifice of either the battery, protection, speed, or coal endurance. As an illustration of the requirements of this class of vessels, it is instructive to compare the various designs recently adopted in Europe.

Russia leads the way with the huge armored cruiser *Ruric*, of 11,000 tons displacement. England is now completing the *Blake* and the *Blenheim*, of 9,000 tons, and nine cruisers of the *Edgar* class, of 7,500 tons. France is building the *Dupuy de Lome*, of 6,300 tons. Germany has in course of construction the vessel known as cruiser "H," of 6,000 tons, and it is reported that seven more of this latter type are contemplated. Finally, Spain has ordered six armored cruisers, the first three of 6,900 tons, now approaching completion, while the fourth has been increased to 9,200 tons, and the remaining two will probably be of similar displacement. While comparisons between these vessels would be invidious, it may be stated broadly that in none of these instances has the displacement fallen appreciably below 8,000 tons without a departure, to a greater or less extent, from the high standard of requirements laid down.

Passing from the class of vessels represented by the *New York*, in which the highest efficiency of the cruiser type is reached—in fact, which may be considered the best all-round vessel of any type—it appears that the construction of smaller cruisers or gunboats, of 3,000 tons displacement and less, carrying a heavy battery, but few or no rapid-fire guns, with a light protective deck, moderate speed and small coal endurance, has ceased entirely. In the few vessels of this size that are being designed at present a battery composed entirely of rapid-fire guns of from 4 to 6 inch caliber is the essential feature, and this is

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combined with high speed. Whether an adequate coal endurance can be obtained in vessels of this size is not fully settled, and it is clear that they can have but little protection. Until this type is more fully developed and further information is gained as to its efficiency, the Department would not recommend an advance in this direction.

It is to be noticed that these vessels differ essentially from those of the so-called gunboat class. Although the gunboats are handy and reasonably cheap for peace cruising, it is neither wisdom nor economy to build ships for peace cruising only. A vessel like the *Petrel*, which can only steam 12 knots under favorable circumstances, so far from being a help to any squadron to which it is attached, is a continuous source of weakness. The speed of a fleet is that of its slowest ship. If it were desirable to direct a force of cruisers rapidly upon a given point, and the exigencies of the service required that they should proceed there in company, the presence of the *Petrel* would nearly double the length of time required by the operation; and when the force arrived upon the scene of action, her want of speed would reduce her in battle to the condition of a mere target. Nor could any use be made of her in torpedo operations or in blockade.

There is, however, a class of small vessels capable of performing successfully many of the duties now required of gunboats, which are known as torpedo cruisers. The characteristics of the torpedo cruiser are well defined: Small size (about 800 to 1,000 tons), light draft, a speed of 22 knots, adequate coal capacity, rapid-fire guns, and a powerful torpedo armament. It combines the ability to keep the sea of the gunboat, with the speed and formidable armament of the first-class torpedo boat. It has many functions. Acting independently it is a seagoing torpedo boat, a commerce destroyer, or a blockade runner, and can destroy an enemy's torpedo boats, and in blockades its presence is indispensable. In action its duty is to destroy an enemy's torpedo boats, to serve as the support of a torpedo-boat flotilla, and to act as a torpedo boat itself. This is the type of vessel that the Department would propose to build should Congress adopt its recommendation to increase the limit of cost in the vessel authorized by the act of June 30, 1890; and such a vessel would be a valuable addition to the naval force.

For river service on the Asiatic and South Atlantic stations the Navy needs urgently four small vessels of special design. For many years we employed for river service in China two old double-enders that survived the war, the *Ashuelot* and *Monocacy*, roomy side-wheelers of light draft, which could navigate the rivers and carry from point to point a large force of men. The *Ashuelot* was sunk in 1882 and the *Monocacy* is now unseaworthy and practically beyond repair. She is, however, still employed upon river service. Great need has been felt of a vessel to take her place, and the necessity will become still more urgent as soon as she is condemned.

For this purpose I recommend the construction of a vessel specially

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adapted for river service, but so constructed as to be capable of the highest military efficiency in the quarter where she is intended to operate. Several types have been proposed for the service. One of the best would be a vessel of about 1,200 tons displacement and having a speed of not less than 17 knots. She should be 230 feet long by about 40 feet beam, and her maximum draft should not exceed 9 feet. The necessity of light draft is emphasized by recent experience. The town of Ichang, the scene of one of the late Chinese riots, could not be reached by any gunboat in the foreign fleets. All of them drew too much water. The battery of the river-service vessel should consist of 4-inch and 1-pounder rapid-fire guns and a number of revolving cannon and machine guns. Such a vessel, which would cost about $400,000, would immediately prove herself to be the most useful vessel of any foreign power upon that station. With slight modifications such a type would answer both for the Asiatic and South Atlantic squadrons.

Until recently the Department could not urge the necessity of torpedo boats, being without any torpedoes with which to arm them. As stated elsewhere, this defect is now remedied, and with the domestication of the manufacture of the Whitehead torpedo, there is no reason why the construction of these necessary vessels should be longer delayed. The following table shows the comparative situation of sixteen principal States in the matter of torpedo boats, and the position occupied by the United States in the list calls attention forcibly to the importance of providing this economical and effective means of defense.

Torpedo boats built, building, or projected, 1890 and 1891.

Nation.	Number of boats.		Increase during past year.
	1890.	1891.	
France	210	215	5
England	177	199	22
Germany	180	180	.....
Italy	152	165	13
Russia	143	152	9
China	32	69	37
Austria	61	65	4
Greece	51	51	.....
Holland	50	50	.....
Denmark	34	34	.....
Norway and Sweden	31	34	3
Turkey	30	32	2
Japan	24	28	4
Brazil	15	16	1
Spain	15	15	.....
United States	1	2	1

The construction of torpedo boat No. 2 at Dubuque, Iowa, represents a new and important step in the development of the resources of this

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country for purposes of naval shipbuilding. Hitherto this work has been done almost wholly on the Atlantic and Pacific seaboards. Many rolling mills and shops in the interior, especially in Pennsylvania, Ohio, and Illinois, have performed a share of the work, but the shipbuilding has been done on the coast. The construction of a torpedo boat on the Upper Mississippi, however, opens up great possibilities for development in this direction in the heart of the country.

It should be our policy in the building of our Navy, to create, as far as possible, an equal distribution of benefits, and to promote manufacturing industries and the employment of workingmen in all parts of the country. The interior has also a distinct advantage over the coast, in that it is far removed from any possible attack to which our seacoast establishments, private and public, would be peculiarly vulnerable.

It is to be hoped, therefore, that the torpedo boat is only a beginning of naval construction in the interior. Not only this type of vessel, but all the smaller craft of the new Navy, including torpedo cruisers, and particularly the light-draft vessels intended for service on the Asiatic station, should be made the subject of competition by the numerous shops that are to be found in the valley of the Mississippi and the Ohio. There is no reason why facilities for such work should not be found or created at Pittsburg, Cincinnati, Louisville, St. Louis, New Orleans, and other manufacturing points; and every establishment that acquires the plant for building a naval vessel in these waters makes a distinct and important addition to the naval resources of the country.

PERSONNEL.

The report of last year pointed out the necessity of Congressional action in reference to the naval personnel, both of the line and Engineer Corps, and suggested certain measures that might have the effect of a partial remedy.

That the importance of the subject was recognized by Congress appears from the fact that the Senate at its last session, on February 15, 1891, authorized the Committee on Naval Affairs to sit during the recess for the purpose, among other things, of considering bills relative to the personnel of the Navy.

It is the desire of the Department to further and assist Congressional action in this direction by every means at its command. With this object in view it appointed, on June 24, a board of line officers, composed of Capt. R. L. Phythian, Commander F. E. Chadwick, Commander C. H. Davis, Lieut. Commander R. Clover, Lieut. G. W. Mentz, and Lieut. Wm. H. Schuetze, to examine into and report upon the present condition of stagnation in the promotion of line officers, and to recommend such measures as it might deem desirable on the subject, with a view to the increased efficiency of the Navy.

In reference to the Engineer Corps, whose necessities are of a some-

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what different character, no board was deemed necessary, the reports of the Engineer-in-Chief having pointed out with clearness and ability the measures considered necessary by him to promote the efficiency of the corps. These measures, and especially the increase in the number of the corps, were made the subject of recommendation in my report of last year. It was then stated that there were not at the time "enough engineer officers in the Navy for ordinary working purposes, and if no additional ships were built an enlargement of the corps would be necessary." A modern man-of-war is a vast and complex machine, needing intelligent and trained minds to insure a perfect working of the parts, failure in any one of which may be fatal at a vital movement; and the sense of responsibility, the physical and nervous strain upon the engineer officer charged with the care and supervision of this network of machinery, is very great. His duties are not only of the highest importance, for upon him mainly depends the efficiency of the motive power, but they are at the same time arduous and dangerous. Manual labor and subordinates are at his service, but he can not be everywhere, and he should have the assistance of men like himself to bear their share of his load.

It is false economy to put in our new vessels all that is most advanced in high-pressure machinery and the multitude of engines and devices by which steam and mechanical appliances are made to do the work of man, and then to provide an insufficient number of officers to control them.

In reference to the line officers, the report of the Phythian Board, transmitted herewith, is commended to the careful attention of Congress. The picture it presents is not overdrawn, and its argument in favor of measures looking to a change will convince any impartial observer that a radical change is necessary. The remedy proposed is believed by the Department, to meet in its general principles, the necessities of the case, although many of its details will require essential modification.

Among the causes of the present stagnation, the most noticeable is the fact that in those classes which entered the Naval Academy during and immediately after the civil war, the numbers actually on the list are far in excess of those which would be found in a normal condition of the service. While the eight classes entering the service during the years from 1852 to 1859, are represented to-day on the Navy Register by fifty-two officers, the succeeding period of eight years, from 1860 to 1867, is represented by 310 officers. Allowing for the larger numbers naturally to be found among the younger men, the normal strength of these classes should be 180.

So much overweighted are the classes below 1860 that if the highest officer of that class were to-day the senior rear-admiral, the officers of the dates from 1860 to 1867 would fill the grades of rear-admiral, commodore, captain, commander, and lieutenant-commander, and the first

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ninety numbers in the grade of lieutenant, although the highest officer in the whole number is in length of service only eight years above the lowest. Such a disproportion between length of service and rank can only be productive of the most harmful results. At the present time the twentieth and eighty-fourth commanders differ by only one year in actual length of service, though the dates of their commissions as commanders are over twelve years apart. Even among men of the same date this disproportion exists to an extraordinary extent. The head of the date of 1861 has been a commander for seven years, while the last man of that date is No. 10 on the list of the grade below, and therefore at least two years from promotion, making a difference of nine years between two officers who entered the service almost on the same day.

When the officers in the overweighted classes begin to reach the head of the list, retirements will take place with extreme rapidity. Officers who have reached the age of 55 in the subordinate station of lieutenant will pass through the upper grades with little more than a year in each. It will be impossible when that time comes to order captains to sea for an ordinary cruise, because there will be hardly any captain on the list who will have the length of a cruise to serve before promotion to the rank of commodore. But the serious difficulty is that they will lack not merely the time, but the qualities necessary for the exercise of command. The safety and efficiency of a ship of war depend to-day more than ever upon her commanding officer. He is the directing brain of the vessel. Upon his steadiness of nerve, his coolness and accuracy of judgment, his ability to be bold or cautious at a critical moment, rest the safety of many lives, of property whose value can not be estimated in figures, and finally the preservation of the honor of the flag. Such responsibility can not be safely intrusted to men who are still lieutenants at the age of 55, and who are physically and mentally worn out by a lifetime passed in the routine of subordinate duties.

But this is not all. The officer, after a year as lieutenant-commander, being then 56 years old, will have but six years in which to pass through the grades of commander, captain, commodore, and rear-admiral. The upper grades will thus become a mere asylum for superannuated lieutenants, maintained at an enormous expense, and passing a few months in doing nominal service in grades for whose real duties they have neither the time nor the qualifications. In fact, it may be said that these grades will be a mere conduit to the retired list, for upon the completion of this brief period of useless advancement, the officers will be retired for the rest of their lives on a retired-pay greater than any salary which they have received during the whole period of their active service. The system gives them a compensation of $2,600 a year, or less, during the actual performance of duty, and then transfers them, after a brief interval, to a retired list where they receive $4,500 a year without any employment. Such a system is neither sensible nor economical.

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The object of any plan of naval promotion is to produce efficient commanding officers. To accomplish this, men must reach the rank and responsibilities of command before they have passed the prime of life, and while they have still a reasonable period of service in prospect.

The first measure proposed by the Board is to reduce the Navy list to a normal condition, with a fair distribution of officers of different ages throughout the different grades, so that there shall be a suitable correspondence between length of service and rank. A slight modification is made in the numbers assigned to the different grades, but retaining the same total on the active list as at present. It is proposed that a board of competent officers shall be convened to nominate for the grades in the active list of the new organization the best officers of the Navy, keeping the present order of seniority among those so chosen, but filling the grades from the top down as far as the selected names will go. From among those not selected a reserve list is to be formed composed of officers qualified for shore duty, who would be so employed at the discretion of the Department, but whose promotion would cease immediately upon their transfer to the new list.

Those who are nominated neither for the active list nor for the reserve list would be retired at once. Vacancies occurring in the active list, after that list had been formed, would continue to be filled as at present, by graduates from the Academy, all of whom would be required to serve as ensigns for three years. The vacancies created by transfers to the reserve list would be gradually filled by admitting ten additional graduates a year, thereby keeping the total list at about its original numbers.

The list having been reorganized, the Board sets forth three principles as the basis of its further recommendations: First, that the object of any system of promotion should be to produce efficient commanding officers; second, that the officer should not be promoted to flag rank or command rank unless he has a certain period of service before him; and third, that final compulsory retirement should be based on length of service rather than upon age, as at present.

To carry out the first two of these principles, the report recommends the following system of selection in making promotions to the two grades which represent respectively flag and command rank. From the head of the list of captains a number of officers, equal to twice the number of vacancies in a given year, is considered as eligible for promotion, and from this number the best are chosen by the Board to fill the vacancies. Their relative rank remains the same as before, but no captain is to be promoted unless he has five years still to serve before retirement. Captains whose names have been twice considered without having been selected for promotion, or who have reached a period of forty-one years of service, retire as captains. A similar plan is adopted in promotions from lieutenant-commander to commander, the necessary period of service in prospect being eighteen years instead of five.

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With many of the features of the Board's plan the Department is fully in accord, but it finds others that are open to serious objection. It believes that a scrutiny similar to that suggested in the report is advisable, but it is strongly of the opinion that, before the scrutiny takes place, an opportunity should be given to those officers who may so desire to make, as a voluntary step, the transfer which the scrutiny contemplates. I would recommend that this should be done in three ways: First, by allowing all officers who are veterans of the war to retire on their own application with advancement to the next higher grade; second, by allowing all officers who have passed more than fifteen years in one grade to retire on their own application, with advancement to the next higher grade; third, by allowing all officers having twenty years or more of service to go upon the reserve list on their own application, without further promotion, and subject only to shore employment.

These three measures will secure, first, an honorable retirement in the nature of a well-earned reward for those whose services have been most meritorious; second, the advancement of one step for those who have suffered injustice by reason of long-delayed promotion; and third, it will enable such officers as prefer it to go of their own option upon the reserve list, thus exchanging the benefits of promotion and increased pay for the benefits of shore duty. These measures will also accomplish a considerable part of the necessary reduction of the list by a voluntary instead of a compulsory transfer.

After these voluntary transfers are completed the scrutiny should be held and the selection made, not, as proposed by the Board, of the best officers of the Navy, which is a somewhat invidious ground of distinction, but of those officers *best fitted for sea duty.* The new active list will then include only officers who are fit to go to sea, who want to go to sea, and who mean to go to sea, and they are the only officers who are entitled to promotion. It should also be provided that the numbers selected for this active or sea-going list should comprise not less than 85 per cent of the total number remaining after the voluntary transfers had been made. The large number of vacancies thus made at the foot of the new active list should not be filled at once, but only as casualties occur in the original body of officers composing both the active and reserve lists.

In reference to the question of selection, the Department believes that a limited application of the principle of selection in place of seniority as the basis of promotion is a necessary feature of any successful plan. It has been tried for many years in the Army, and has been found to increase its efficiency in a high degree. It may be that the officers selected for the positions of general officers in the Army are not always the best in the service, but they are never bad or incompetent. There is no reason why the system should not work equally well in the

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Navy, or why this branch of the service should be placed relatively at such a serious disadvantage. No system can be considered sound or reasonable which assumes, as does the present system of seniority promotion, that every individual who graduates from the Naval Academy is just as well fitted as any other for positions of high responsibility and command. Its defects have again and again been pointed out by my predecessors, and a change has been repeatedly advocated in the interest of economy and efficiency.

I would therefore recommend in place of the complex system of the Board, the adoption of the system now in force in the Army, as being simpler, better, and more effectual. Under this system the President should be authorized to select from the grade of captains the officer who, in his judgment, is best fitted for the grade above, and the same rule should hold good in promotions from commodore to rear-admiral.

The present system can not endure much longer. With the new ships we must have a personnel whose efficiency is beyond question, and whose excellence is on the increase and not on the wane. No country could afford to keep up such a system and maintain a body of officers such as the line of the Navy will become in a few years under existing conditions. No country could afford to pension in the higher grades officers whose whole time in these grades has been too short to enable them to perform any actual duty, and who hurry one after another, as admirals of a few months' service, to a constantly increasing retired list with constantly increasing rapidity.

I would further recommend that the designations of the grades of rear-admiral and commodore be changed respectively to vice-admiral and rear-admiral, the numbers, pay, and relative rank of the grades remaining the same as at present. The number of captains should be fixed at 60, as recommended by the board.

ENLISTED MEN.

In the annual report for 1889 the condition of the enlisted men was fully discussed. I desire to renew the recommendations made at that time, and especially that the number of apprentices be increased from 750, as now allowed by law, to 1,500. The measures proposed two years ago for the purpose of securing a more permanent class in the corps of enlisted men are again recommended, and it is strongly urged that the principle be adopted of retaining the services of the men for life by substituting a plan of continuous service for the present method of temporary enlistment. The Department believes that for emergencies a four years' term of enlistment should be adopted, and recommends that the laws relating to honorable discharges after three years of service, and to allowances upon a three years' re-enlistment, be amended accordingly.

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NAVAL MILITIA.

In my first annual report I called attention to the great importance of a trained militia for the Navy, and the advantages that would result from such an organization both to the regular service and to the country at large.

The subject was further discussed in the report of last year, and it was recommended that an appropriation should be made by Congress for the supply of arms in the same manner as had been done for many years for the land militia. It was predicted at the time that if such an appropriation were made the creation of the naval militia by the States would be assured.

In pursuance of this suggestion Congress, in the naval appropriation act of March 2, 1891, appropriated $25,000 for the purchase of arms for the militia, to be expended "under such regulations as the Secretary of the Navy may prescribe." This sum became available on the 1st of July, and, in accordance with the terms of the act, a circular was issued and sent to the governors of the several States. The regulations governing the distribution of the appropriation are as follows:

NAVY DEPARTMENT,
Washington, D. C., June 20, 1891.

Under the authority conferred by the naval appropriation act, approved March 2, 1891, in the following terms:

"NAVAL MILITIA: For arms and equipment connected therewith for naval militia of various States under such regulations as the Secretary of the Navy may prescribe, twenty-five thousand dollars,"

the following regulations are prescribed:

(1) Upon receipt of a return from the governor of any State of the number of men actually mustered in and serving in the naval militia of said State, on the 1st day of July, 1891, the Secretary of the Navy will allot to the State making the return, from the general appropriation for the naval militia, a sum equal to $12 per head for each officer and man so returned.

(2) The balance of the appropriation will be held in reserve until the 1st of October, 1891. Upon the receipt of a similar return on that date the balance will be allotted to the States then making returns, at the rate of $12 per head for every officer and man returned as actually mustered in and serving on that date in the naval militia of the State, in excess of the number returned on the 1st of July.

(3) Should the number in excess returned on the 1st of October be too great to admit of a distribution at the rate of $12 per head as prescribed in section 2, the balance remaining over from the July allotment will be distributed pro rata among the States making returns, according to the number returned in excess.

(4) Should a balance remain over after the allotment of October 1, provided for in section 2, it will be allotted pro rata to all the States having a naval militia, in accordance with the whole number of men returned by each State as actually mustered in and serving on that date.

(5) As soon as the allotments are made, in accordance with the above regulations, the amounts allotted will be credited to the States entitled thereto on the books of the Navy Department.

(6) Requisitions for arms and equipments will be made by the governors of States direct to the Secretary of the Navy, who will determine and order which of such arms and equipments, their number and character, shall be issued.

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(7) When a requisition is received at the Navy Department the Bureau concerned will be required to give the money value of the stores called for and the Navy Department will determine and order which of said stores, their number and character, shall be issued.

(8) All property issued upon requisition shall be accounted for under the regulations which now govern the accountability for public property in the Navy, and the Navy Department will issue the necessary instructions for the safe-keeping, preservation, inspection, and accountability thereof.

(9) The Navy Department will furnish the governors of the several States possessing a naval militia force with the necessary blank forms to carry out the provisions of the above sections. All returns shall be made to the Secretary of the Navy.

It was desirable that some part of the appropriation should be allotted on the 1st of July to those organizations that were already in existence. This amount was fixed at $12 per man actually mustered in and serving. As a stimulus to further activity the balance was reserved until the 1st of October, when a further allotment was made to those States whose forces had increased in the mean time, the final balance still remaining being apportioned among all the States having a naval militia organized at that date according to the numerical strength of the organizations.

The fund appropriated by law is not distributed directly to the States, but is applied, under the supervision of the Bureau of Ordnance, to filling requisitions for arms and equipment connected therewith, made by the governors of the several States, in the same manner as the appropriation for the land militia in charge of the War Department.

The result of the three allotments made from the returns received on July 1 and October 1 was as follows:

California	$8,094.43
New York	7,461.71
Massachusetts	5,123.93
North Carolina	2,203.60
Rhode Island	1,178.16
Texas	938.17

The number of men certified as mustered in and serving in the naval militia is as follows:

California	371
New York	342
Massachusetts	238
North Carolina	101
Rhode Island	54
Texas	43
Total	1,149

The naval militia, therefore, comprises to-day an effective, organized force of over 1,100 men distributed among six States. From information received from various sources, it is beyond question that as soon as the necessary authority is given by enactment of their respective

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legislatures, other States will immediately establish organizations, and the number of men in the service will be largely increased.

An estimate of $25,000 has been submitted for continuing the arming of the militia, but it is earnestly hoped that Congress may see fit to increase this amount in order that this new and most important branch of the service may be placed on a substantial footing.

The Department has endeavored to facilitate and encourage by every means in its power, the training of the State organizations. With this object in view, and also partly to contribute to the training of the Navy itself, the squadron of evolution conducted drills for two successive weeks at Boston and in Long Island Sound for the militia organized in Massachusetts and New York, the two States most advanced in preparation.

The importance of this movement, which is destined to add to the reserve strength of the Navy a considerable force of militia, with all the advantages of thorough preliminary training, will be universally appreciated. It should be helped and forwarded in every possible way. The drills of the naval militia during the past year have shown how much can be accomplished in this direction by organization and discipline. Under the command of capable officers, many of whom have had professional experience, the naval battalions have reached a high state of efficiency, and the establishment of the naval militia must be regarded as one of the important events in the record of our naval progress during the past year.

NAVAL ACADEMY.

The Department desires to urge strongly upon Congress a change in the time of nomination of cadets at the Naval Academy, by which they may be designated a year in advance of the date of admission. For many years a large proportion, sometimes as many as 50 per cent, of the candidates have failed either at the entrance examination or during the course. These failures have been largely due to insufficient preparation. It is an injustice to many deserving young men that they should be forced, often at a few days' notice, to stand an examination for which they have had no opportunity to prepare. Should the system of nomination mentioned fail to give good results, it can easily be changed; but there is every reason to believe that it will reduce to a minimum the objections to the present system.

Under the law as it exists to-day the only offense for which cadets may be tried by court-martial is that of hazing. Although the ordinary discipline of the Academy is sufficient to provide for the punishment of minor offenses, it is desirable that the process of trial by court-martial should be applied in graver cases. The cadets of the Military Academy are subject to the jurisdiction of courts-martial, and I recommend that a general provision of law be adopted extending this jurisdiction, in cases of serious offense, to the cadets of the Navy.

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ATTENDANCE OF WITNESSES AT COURTS-MARTIAL.

Naval courts-martial and courts of inquiry have been seriously embarrassed in their proceedings by reason of the absence of power in such courts to obtain the testimony of civilian witnesses in cases where such persons have refused to appear in obedience to summons duly served upon them. Under the provisions of section 1202 of the Revised Statutes, military courts-martial are empowered to compel the attendance of civilian witnesses. I would recommend, therefore, that power be extended to naval courts-martial and courts of inquiry, similar to that vested in military courts, to compel the attendance of civilian witnesses.

CONSOLIDATION OF NAVAL STORES.

The report of the Paymaster-General shows the great benefits derived from the provisions of the act of Congress approved June 30, 1890, directing that naval stores should thereafter be charged as property belonging to the Navy and not to any bureau thereof. It will be remembered that the object of this measure was to throw open to general use the immense accumulation of stores in the hands of separate bureaus, which had been increasing in size for many years, and to prevent such accumulation in future. As had been foreseen the effect has been a marked reduction in the balance of stores on hand. The returns for the fiscal year immediately preceding the passage of the act showed an increase in the balance of supplies on hand of nearly $300,000 at the close of the year. The returns from shore stations for the last fiscal year subsequent to the passage of the act show a decrease of over $1,400,000. Of this decrease $300,000 is due to transfers of accounts, but the actual consumption during the year of old stores on hand, formerly belonging to the several bureaus but made available for general use by the act, amounted to $569,000. The greatly increased demands of the Navy during the past year have been met to an extent hitherto unprecedented by the use of stock on hand.

The total value of all supplies afloat and at shore stations, although actually increased to the amount of $1,600,000 by new articles manufactured in the yards, such as guns, gun carriages, anchors, etc., shows a net decrease as compared with the preceding year of $169,000.

It is obvious that the change thus accomplished has resulted in great saving to the Government, and that the permanent locking up of stores in the possession of one bureau and their extravagant duplication by other bureaus, which prevailed in former years, have practically ceased.

The work of "arranging, classifying, consolidating, and cataloguing supplies," for which a small appropriation was made in the act of June 30, 1890, has only been partially completed and the Department has approved an estimate for an additional $10,000 for this purpose. The appropriation of this amount, considering the importance of the work, and the increased accountability and care which result from it, is an economical measure.

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The system of purchase and custody of supplies now placed, with the exception of some few exempted classes, in the hands of the Bureau of Provisions and Clothing, has shown a marked improvement during the past year. Delays still occur in the delivery of supplies, but the enlarged application of the system is being made with patience and persistence, and its methods are daily becoming more fully perfected. The advantages of the new system are beyond question, and since its establishment the Department has been able to know with exactness, for the first time, the actual condition of its stores.

The position of chief clerk of the Bureau of Provisions and Clothing is one of very great importance, and the compensation is inadequate. It is therefore recommended that it be increased to $2,500 per annum. A similar increase should be made in the compensation of the chief clerk of the Bureau of Construction.

I desire to renew the recommendation of my predecessor, made in the Annual Report for 1887, upon the suggestion of the Paymaster-General, that Congress may legalize the use of the sum of $24,500, which was transferred many years ago from the appropriation "Pay of the Navy" to the credit of the cadets' storekeeper at the Naval Academy, to constitute his capital to transact the duties devolving upon him under the law. The required measure is merely a transfer on the books of funds already appropriated. The new fund should be designated "Clothing and other necessaries for naval cadets."

I would also renew the recommendation made by me in my previous reports that the name of the Bureau be changed to "Bureau of Supplies and Accounts," which name would accurately define its duties.

NAVY-YARD PLANTS.

In view of the heavy expenditure made necessary at the present time by the large tonnage, and especially by the large armored tonnage of vessels which it has fallen upon this administration to construct, the Department has been unwilling to recommend an immediate appropriation for the improvement of the navy-yard plants for the purposes mentioned in the accompanying reports of the different Bureaus. These improvements will, however, be urgently needed when the new steel fleet now building has been for a time in commission, or if, in the meanwhile, the country should suddenly be called upon to put forth its naval strength.

When mechanical appliances are used so extensively and for such multifarious purposes as is now customary on naval vessels, the necessity of well-equipped repair shops becomes imperative. I have stated in another part of this report that the relatively high cost of navy-yard work is in part due to poorly-equipped shops. If the construction and engineering shops at the general repair yards had been supplied with a plant as complete for its purposes as that which the appropriations of recent years have enabled the Department to develop at the Washing-

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ton yard for the manufacture of ordnance, the economical results obtained at the latter yard, which were dwelt upon in the report of last year, might have been more nearly reached elsewhere. At the present time the yards are not properly fitted for ordinary repair work in time of peace, and an extraordinary demand could not be adequately met with the resources now at the command of the Department. Such a demand may occur at any time by the mere coincidence of repair work upon a considerable number of ships.

While, therefore, the Department has stricken out from the Bureau estimates all items of this character which could safely be postponed, it desires to call attention to the subject as one that must sooner or later engage the attention of Congress.

EMPLOYMENT OF LABOR AT NAVY-YARDS.

Not the least important among the new and difficult problems that have confronted the present administration of the Navy Department, is that of the building and repair of modern steel ships and engines in the navy-yards. A part of the work of building new ships should be done at the yards, because the Government must always be in a position to be independent of private contractors; and all of the repair work must necessarily be done there. Until recently this work was confined to wooden ships. During the last administration some repairs had been made upon the *Boston* and the *Dolphin*, and shortly before its close the keel of the *Maine* was laid at New York; but, with these unimportant exceptions, nothing whatever in modern shipbuilding or repairing had been done by the Government navy-yards prior to March, 1889.

The Navy Department was therefore called upon, at the opening of this administration, to start on its own account a new manufacturing business—the construction and repair of steel ships. The previous work of the navy yards on wooden vessels was an entirely different branch of manufacture and of a much simpler character. The hull of the old ship was merely a wooden chamber divided into flats, and the principal work on it was done with the saw, the adze, the chisel and mallet, the auger, and the rest of an ordinary ship carpenter's outfit. It was work that required no mechanical appliances, and only ordinarily skilled manual labor.

The ship of to-day is an entirely different structure. It is built wholly of steel. Every step in construction or in repair, every job of cutting or fastening, no matter how small, requires the use of machine tools and workmen of the highest skill. Not only in the frame and the skin of the ship, but in all its minor appliances, a great change and development have taken place. The war ship of the present day is one of the most complicated machines of modern times. There is no comparison between the difficulties of the old and the new classes of work. They are as different as making a bucket and making a watch.

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To illustrate still further the character of this work, it should be stated that the first step in the construction of the steel vessel is the preparation of a complete set of working drawings giving the exact dimensions of each one of the thousands of plates, beams, and angle irons of which the hull is composed, so that they may be ordered of the steel-maker with as little waste of material as possible. Every one of these pieces of steel has its designated place in the finished structure and it must be used in that place only. This requires that every mechanic who has charge of even the smallest job of work should be able to understand readily and without the possibility of error all the indications furnished in the drawings.

Not only in the interpretation of the drawings, but in the actual putting together of the parts, including the framing and plating of the hull, the highest accuracy of workmanship is required. Plates 20 feet long and from 4 to 5 feet wide must be sheared and planed to size so accurately that absolutely water-tight joints may be made between the adjoining plates. The rivet holes must be so carefully marked and punched or drilled that when the plates are bent and assembled in position there may be an exact coincidence between the openings. To force the metal about the rivet-holes so that the rivet may be put in place would cause serious injury to the material and might be a source of actual danger to the ship.

The same accuracy is required in the adjustment of the plating of the hull. With the high speeds now required of naval vessels, the fairness of the lines of the outside plating is a matter of the first importance and must have a serious influence upon the speed attained by the ship.

In addition to the demands made by the mere operation of putting together the parts of the hull there are others caused by the enormous development in number and importance of the internal fittings of modern men-of-war. Since the lightest rapid-fire guns will pierce the side plating of many of our unarmored cruisers, their engines, boilers, and magazines must be covered in by a protective deck of curved shape with its crown placed near the load-water line, and its edges extending some distance below. As this deck is intended to keep out water from the lower part of the hull in case of shot holes above it, it must be thoroughly water tight. Its employment renders difficult the ventilation of the lower part of the ship, and required a great extension of the ventilating system. As an illustration, the appliances in the *San Francisco* for this purpose consist of 2,000 feet of air ducts weighing over 64,000 pounds. In addition to this general system there are eight steam blowers for the fire rooms to supply air to the boilers, and a large number of ordinary air shafts giving natural ventilation from the upper deck.

The protective deck also increases the difficulty of lighting the ship, and makes necessary an electric-light plant. The innumerable water-tight steel bulkheads, through which the electric-light mains must pass, render the installation of the wiring an arduous task, and necessitates

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the greatest care on the part of the workmen to insure both water-tightness of the holes through the bulkheads and the satisfactory installation of the conductors.

The minute subdivision of the hulls of ships of war to localize as much as possible the effects of injury to the skin of the ship, either from shot holes or grounding, and to reduce to the lowest point the possible loss of stability and buoyancy, require not only that all the points of juncture at the sides of the compartments should be perfect, but that every opening through the bulkheads should be provided with absolutely water-tight fittings. The *San Francisco* has thirty-five water-tight doors. The failure of one of them to act properly in a time of emergency might produce serious if not fatal results, and when the limitations of weight, always present in naval designs, are considered, the need of the most careful workmanship, both in the manufacture and installation of all water-tight fittings, is apparent.

It is evident that in such a structure as has been described the drainage system must be exceedingly complicated. On the *San Francisco* there are 330 feet of principal drainage pipes, varying from 8 to 11 inches in diameter, and 1,200 feet of branch pipes. This piping is subdivided and suction to the pumps is controlled by ninety valves, and it is connected to sixty suction boxes and strainers. There are also fifty sluice valves connecting different compartments. This system of piping and valves, weighing over 45,000 pounds, requires the greatest care in installation, since its important parts are often in positions difficult of access, where a continued examination is hard to accomplish, and repairs, if made necessary by incompetent workmanship, would be attended with great expense.

Many other classes of fittings might be mentioned, which naval requirements render of a peculiarly novel or complex character. The steering gear must be placed well below the water line in order not to be exposed to the enemy's fire, and is necessarily in a cramped and inaccessible place. The anchor gear requires continually varying arrangements so that the storage of anchors and davits may not interfere with the end-on fire of the battery. Each of these systems has its own set of engines and connections. The operations of distilling and hoisting heavy weights must also be accomplished by machinery. The heavy guns, weighing from 20 to 65 tons each, must be moved, and the turrets, weighing 300 tons each, must be turned by the same appliances.

What has been said of the hull and fittings applies with equal force to the machinery. In the *San Francisco* there are, in addition to the main engines driving the propellers, thirty-seven auxiliary engines, whose collective horse power equals that of the main engines of many of our vessels of a few years ago. The accuracy of the adjustments of the running parts of this machinery, rendered tenfold more necessary by the high rate at which it is required to run, calls for thorough workmanship alike in its construction, maintenance, and repair.

As an illustration of the disastrous results that may follow the fail-

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ure of an apparently unimportant part of the machinery may be mentioned the accident that occurred March 23, 1890, to the steamship *City of Paris*. The primary cause of this accident, by which the starboard engine was entirely wrecked and the ship placed in a position of great danger, which only failed of a fatal termination from the excellence of the design and workmanship of the remaining parts, was the wearing down of the bearing in the shaft strut which supported the extreme end of the propeller shaft. The shaft became bent and finally ruptured, and the cessation of all resistance and the consequent increased velocity of the machinery resulted in wrecking the engine. The cause of the accident is said to have been found in the bursting of a small gun-metal ring or liner of the shaft, and this insignificant defect came near resulting in the destruction of many lives and millions of property.

To turn over work of the kind described to unskilled workmen is to imperil the efficiency of our ships, and to ruin the new Navy, which has been built up with such infinite labor and pains, faster than it can be acquired; and, at the same time, to involve the Government, through the Navy Department, in an extravagant and needless expenditure. Considerations of efficiency in the first place, and of economy in the second, therefore, demand that some practical, business way shall be found to secure competent workmen. It has fallen to this administration to be the first to grapple with the question; and I have considered that, no matter how great the difficulties, I should not be justified in shirking or evading the duty.

The question has been: How shall the Navy Department get good foremen and good workmen in its building and repair yards? I have arrived at the conclusion that it can only be done on the same plan as that which prevails in private establishments—to give the places to the best class of mechanics that can be procured for the prices the Government can afford to pay, regardless of any other consideration than their mechanical skill.

The general object proposed above, the necessity of which no one can deny, could not be accomplished without a radical change in organization. Everybody knows, and it is of no use to evade the fact, that the navy-yards have heretofore been used largely for purposes of political patronage. The system which I found in existence placed the power of the appointment of workmen in the hands of the foremen, and the foremen were generally political appointees. With such a system it was impossible that the test of fitness for employment at the yard should be the skill of the applicant; for those by whom he was recommended were not his employers and had no knowledge of his qualifications as a workman. Nor could the foreman, owing his appointment to local influences, resist, even if he so desired, the pressure of personal considerations.

Although in the old days this system must have entailed considerable loss to the Government, yet there being no great demand for skill it did not absolutely prevent the carrying out of work at the yards.

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Any man who could bore and mortise could render some service more or less valuable to the Government. But the work which the yards are now called upon to perform can not be done under that system. The workmen must be chosen for their qualities as workmen, and this can only be accomplished by excluding every other consideration than those of skill and competency.

The impending change in the character of navy-yard work and the corresponding change demanded in methods of navy-yard administration were foreseen and fully described by Secretary Chandler at the time when the first steel vessels were begun. In his annual report of 1883, in speaking of the navy-yards, he uses the following language:

> These establishments must first be thoroughly reorganized in such a way as to exclude all political considerations from their management, otherwise bad and expensive work will be the result. We can not afford to destroy the speed of our naval engines in order to make votes for a political party. Whatever other governmental agency may be conducted with partisanship a great naval workshop, dealing with the hull of a modern steel steamship, its fittings and equipment, and with the complexities of its machinery, can not be successfully so managed. No charge of favoring private shipbuilding establishments should deter any one from asserting that, until the navy-yard workshops are managed on business principles and without regard to politics the construction and repair of the new American navy should be committed to those builders who employ or discharge their foremen and all their artisans according to their skill as mechanics and without caring for their political opinions or votes.

It became evident to me, after two years' experience in the Department, that in order to obtain the kind of workmen required in the navy-yards a specific change of organization was necessary, and a plan for the selection of foremen and other superintending mechanics was put in operation in April last. All the superintending positions at the yard were declared vacant, and a board of officers, whose impartial character was universally recognized, and whose members were practical men, most of them experienced in manufacturing, was appointed to find out the best mechanics to fill the places. Public notice was given, and all mechanics were allowed to compete.

The Department appointed in every case the man whom the board reported as best among the applicants for the position. In some cases the board reported that none of the candidates who appeared were qualified. In these cases, the best among the candidates was appointed temporarily, and the Department is now making a second effort to secure thoroughly competent men in their places.

The next step was to provide for the selection of workmen. The method adopted, which was put in operation on the 1st of September last, was to open an office at each yard, where all applicants could register. This office is in charge of a board, also composed of practical men, either heads of departments at the yards or their assistants, all of whom are commissioned officers.

The board classifies the applicants according to their trades, the only requirement for registration being that they shall be American citizens, and that they shall bring certificates from previous employers that they

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know their trade. When workmen of any particular trade are needed in any department of the yard the head of the department makes a requisition on the board. The board sends in a list of names, taking them in the order of their application, but giving preference to those who have had experience in navy-yard work. The head of the department, on receiving the names from the board, takes the same course that would be followed by the superintendent of a private establishment. He sets the men to work and finds out their fitness for employment, grading them according to their skill if they are good workmen, and if they are not, rejecting them altogether.

Every man whose name is sent to him by the Board must have a trial. It may be a short trial, but the superintendent must try him and come to a conclusion about him. When he rejects men he sends their names back to the Board and new names are supplied until he obtains the mechanics he needs. The registration books, as well as the reasons for rejection in each case, form a permanent record, which enables the Department to maintain an effective supervision and to see that no favoritism is practiced.

The above system may not be the best that can be devised, but it is the best that has so far presented itself, and if anyone can suggest an improvement on it, the Department will be ready to adopt it. It is practically the same system that prevails in any great manufacturing establishment. In such an establishment employment is not governed by personal considerations of any kind. It is a question of good work on the one hand and of dollars and cents on the other. The Navy Department, as far as its manufacturing business is concerned, stands on the same footing. It proposes to obtain efficiency of work, and thereby secure economy ot cost. And as efficient work requires mechanics of high skill, it proposes to select and retain only such workmen as can show that they have the required skill by actual trial.

It has always been recognized that the cost of work in the navy-yards was greater than in private yards. I believe that this difference should not exist, and that by the application of a proper system it may be corrected. That the recent change in organization will be a long step in that direction I do not doubt.

The cost of construction in the yards, in recent years, noticeably in the *Maine* and *Cincinnati*, has proved no exception to the general rule of navy-yard work. Apart from the reduced hours of labor, and the interruptions caused by pressing demands for the repairs of ships in commission, this cost is due to three causes: First, the want of an adequate construction plant; second, the total want of experience of the whole naval organization in work of this character, and the sudden and extraordinary demands that have been made upon it; and third, the want of a practical system to govern the employment of labor. The first of these causes is gradually being remedied by the improvement of the plant, as appropriations are made from time to time by Congress. The second is a defect which time alone can cure, but

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which it has already partly cured. The third the Department has endeavored to meet by the adoption of the new regulations.

As the new system only went into complete operation on the 1st of September last, it is too soon to show the full results of its workings, but it may be stated that during the last three months, when unusual demands were made upon the yard organization for the repairs of ships in commission, the system was put to a severe test, and the voluntary testimony of the officers of these vessels as to the efficiency and promptness with which the work was done is a conclusive proof of the benefits resulting from the new system. It is especially to the "fidelity, energy, and zeal of the navy-yard workmen" that the communications of these officers refer. This result has been brought about not only by the introduction of new and efficient foremen and workmen, but by the discharge of those who are incompetent, and the influence of a new stimulus upon those who remain, all of which is the direct result of the new system.

In reference to the exclusion of political considerations from navy-yard employment which the recent orders have brought about, I deem it proper to call attention to the following statutes, by which the administration of the navy-yards is placed on a footing distinct from every other Department of the Government:

SEC. 1544. Labor shall be employed in the several navy-yards by the proper officers in charge with reference to skill and efficiency, and without regard to other considerations.

SEC 1546. No officer or employé of the Government shall require or request any workingman in any navy-yard to contribute or pay any money for political purposes, nor shall any workingman be removed or discharged for political opinion; and any officer or employé of the Government who shall offend against the provisions of this section shall be dismissed from the service of the United States.

The head of this Department is as much bound by the above laws as by any other on the statute book; and whatever method is adopted to carry them out, he has no choice but to see that they are faithfully executed.

COST OF THE NEW NAVY.

In accordance with the provisions of the naval appropriation act of March 2, 1891, as follows: "The Secretary of the Navy shall incorporate in his next annual report a statement, showing the name and tonnage of each vessel that has been completed since March four, eighteen hundred and eighty-five, when authorized to be built, when begun, and when commissioned, its entire cost of construction, including armor, armament, equipment, and premiums, and its cost for repairs since completion; and, also, a statement showing the name and tonnage of each vessel not completed, when authorized to be built, when begun, the probable date of its completion, the amount expended upon its construction, including armor, armament, and equipment, and the estimated amount required for its completion, including armor, armament, equipment, and premiums," the following table is submitted:

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Statement showing the name and tonnage of each vessel that has been completed since March 4, 1885; when authorized to be built, when begun, and when commissioned; its entire cost of construction, including armor, armament, equipment, and premiums, and its cost for repairs since completion.

Name.	Tonnage.	When authorized to be built.	When begun.	When commissioned.	Cost of construction.	Armament.	Outfit under steam engineering, construction, and equipment.	Special reservations and other outstanding obligations unpaid June 30, 1891.	Premiums.	Total cost of construction, including armament, equipment, and premiums
Chicago	4,500	Mar. 3, 1883	July 26, 1883	Apr. 17, 1889	$1,183,629.21*	$292,257.50	$111,936.71			$1,587,823.42
Atlanta	3,189	....do	July 23, 1883	July 19, 1886	700,000.00*	177,912.75	95,480.99			973,393.74
Boston	3,189	....do	....do	May 2, 1887	700,000.00*	178,280.89	88,248.45			966,529.34
Dolphin	1,485	....do	....do	Dec. 8, 1885	350,000.00*	34,278.79	37,715.68			421,994.47
Newark	4,083	Mar. 3, 1885	Oct. 27, 1887	Feb. 2, 1891	1,309,430.89	169,448.22	115,695.80	$68,419.12	$36,857.70	1,699,851.73
Charleston	4,044	....do	Dec. 28, 1886	Dec. 26, 1889	1,164,504.10	181,954.05	121,500.55			1,467,958.70
Yorktown	1,700	....do	Jan. 31, 1887	Apr. 23, 1889	480,242.65	114,247.78	60,095.36		39,825.00	694,410.79
Petrel	890	....do	Dec. 22, 1886	Dec. 10, 1889	307,996.55	51,280.37	70,033.79			429,310.71
Baltimore	4,600	Aug. 3, 1886	Dec. 17, 1886	Jan. 7, 1890	1,426,504.93	209,294.92	118,446.91		106,441.80	1,860,688.56
Vesuvius	725	....do	Feb. 11, 1887	June 7, 1890	317,555.83		8,020.40			325,575.73
Cushing	116	....do	Mar. 1, 1888	Apr. 22, 1890	98,666.29		1,809.95			100,476.24
Philadelphia	4,324	Mar. 3, 1887	Oct. 27, 1887	July 28, 1890	1,399,336.19	196,298.62	98,386.04	25,000.00	100,000.00	1,819,020.85
San Francisco	4,083	....do	Oct. 26, 1887	Nov. 15, 1890	1,607,642.57	183,471.70	120,233.81		100,000.00	2,011,348.08
Concord	1,700	....do	Nov. 15, 1887	Feb. 14, 1891	529,362.14	81,888.42	66,458.55	26,989.19		704,648.30
Bennington	1,700	....do	....do	June 20, 1891	487,796.41	80,328.11	51,429.76	53,767.63		673,323.91
Total					12,062,669.26	1,960,942.12	1,165,492.75	174,125.94	383,124.50	15,736,354.57

*Cost and valuation by appraisement June 29, 1889 (and including in the case of the *Chicago* $33,629.21 additional expenditures for completion since appraisement).

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In reference to the report of "cost of repairs" called for by the act, it should be stated that the account technically known as Repairs of ships, which furnishes the items here reported, includes not only repairs strictly so-called, but all alterations made for the purpose of increasing the efficiency of the ship, its hull, engines, battery, ventilation, drainage, steering gear, etc. The introduction of new and improved appliances, with which the earlier ships were unprovided, also appears under this head. A considerable proportion of the expenditures charged to the account of repairs is caused by defects in original design and internal arrangement, by improvements in the character of ship's fittings, and by changes found necessary when they were put into actual service. In some cases these changes were made before the ships went on their first cruise. Such items are in the nature of improvements rather than repairs and they increase by so much the permanent value of the property. Nor does the account make any distinction between ordinary repairs, due to wear and tear, and extraordinary repairs, due to casualty, such as the breaking of the hawse pipes of the *Chicago*, when getting up anchor in the swift current of the Mississippi, or the injury to the bottom of the *Boston*, caused by striking a rock in Newport Harbor.

The following table shows the amounts charged to the completed ships, under this head, on the books of the Department July 1, 1891, the amounts in the case of the first four vessels being those that have accrued since the date of appraisal:

Name.	Amount.	Name.	Amount.
Chicago	$42,765.46	Vesuvius	$19,984.98
Atlanta	44,510.59	Cushing	6,118.89
Boston	61,002.97	Philadelphia	15,951.87
Dolphin	31,955.69	San Francisco	747.68
Newark	430.20	Concord	1,748.22
Charleston	33,040.05	Bennington	.....
Yorktown	31,416.59	Total	296,638.00
Petrel	14,570.76		
Baltimore	1,394.05		

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Statement showing the name and tonnage of each uncompleted vessel authorized to be built since March 4, 1885; when begun, the probable date of its completion, cost of construction (including armor, armament, and equipment), to June 30, 1891, with estimated amount required for completion, to include armor, armament, and equipment.

[NOTE.—This statement does not include premiums that may be earned, as the amount of such premiums is wholly speculative.]

Name.	Tonnage.	When authorized to be built.	When begun.	Probable date of completion	Expended in construction (exclusive of armament).	Expended by Bureau of Ordnance for armament in process of manufacture.	Material in hands of general storekeepers purchased for ships, but not yet expended.	Total amount expended upon construction, including armor, armament, and equipment.
Maine	6,648	Aug. 3, 1886	Nov. 5, 1887	1893	$1,564,240.75	$161,641.00	$50,089.00	$1,775,970.75
Texas	6,300	....do	Nov. 8, 1887	1894	904,047.29	115,266.00	117,121.00	1,136,434.29
Monterey	4,048	Mar. 3, 1887	June 14, 1889	1892	1,093,985.78	274,578.00		1,368,563.78
New York	8,150	Sept. 7, 1888	Aug. 28, 1890	1893	1,288,300.07	121,802.00		1,410,102.07
Cruiser No. 6	5,500	....do	July 10, 1890	1893	396,719.43	29,500.00		426,219.43
Cincinnati	3,183	....do	Sept. 26, 1889	1893	493,173.36	33,029.00	45,377.00	571,579.36
Raleigh	3,183	....do	....do	1893	528,800.74	24,779.00	74,504.00	628,083.74
Cruiser No. 9	2,000	....do	Nov. 2, 1889	1892	342,481.92	11,059.00		353,540.92
Cruiser No. 10	2,000	....do	....do	1892	341,433.18	11,059.00		352,492.18
Cruiser No. 11	2,000	....do	Nov. 11, 1889	1892	285,071.67	11,059.00		296,130.67
Gunboat No. 5	1,050	Mar. 2, 1889	Apr. 12, 1890	1892	122,550.24	8,432.00		130,982.24
Gunboat No. 6	1,050	....do	....do	1892	120,119.90	8,432.00		128,551.90
Harbor defense ram	2,050	....do	Jan. 22, 1891	1892	6,170.14			6,170.14
Indiana	10,200	June 30, 1890	Nov. 19, 1890	1894	7,503.01	20,400.00		27,903.01
Massachusetts	10,200	....do	....do	1894	8,005.96	20,400.00		28,405.96
Oregon	10,200	....do	....do	1894	7,556.95	20,400.00		27,956.95
Cruiser No. 12	7,400	....do	....do	1893	500,897.86	12,078.00		512,975.86
Torpedo Boat No. 2	112	....do	Oct. 8, 1891	1892				
Cruiser No. 13	7,350	Mar. 3, 1891	Aug. 31, 1891	1894	3,298.80			3,298.80
Puritan *a*	6,600	Aug. 3, 1886*	June 26, 1889	1893	137,814.82		54,955.00	192,769.82
Monadnock *b*	3,990	....do *	Mar. 26, 1890	1893	277,060.87	96,000.00	26,000.00	399,060.87
Amphitrite *c*	3,990	....do *	Aug. 30, 1889	1893	189,654.16	96,000.00	44,586.00	330,240.16

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Terror *d*	3,990	....do *....	Apr. 25, 1889	1893	328,834.24	155,461.50	21,331.00	505,626.74
Miantonomoh *e*	3,990	Mar. 3, 1887*	Aug. 13, 1887	1891	554,268.89	215,511.00	8,137.00	777,906.89
Total					9,501,980.03	1,446,886.50	442,100.00	11,390,966.53
Practice cruiser	838	Sept. 7, 1888	July 18, 1890	1892	62,794.71			62,794.71
Tugboat No. 1	192.4	Mar. 2, 1889	Dec. 20, 1890	1892	11,677.68			11,677.68
Tugboat No. 2	192.4	....do	....do	1892	11,677.68			11,677.68
Tugboat No. 3	192.4	....do	....do	1892	11,677.68			11,677.68
Total					35,033.04			35,033.04
Grand total					9,599,807.78	1,446,886.50	442,100.00	11,488,794.26

* Completion authorized.

The cost of the monitors stated in this table includes the expenditures incurred subsequent to the passage of the acts authorizing their reconstruction, namely, of August 3, 1886, for the *Puritan*, *Monadnock*, *Amphitrite*, and *Terror*, and of March 3, 1887, for the *Miantonomoh*. The expenditures prior to these dates are as follows:

a Expenditures made prior to August 3, 1886	$981,762.46
b Expenditures made prior to August 3, 1886	622,705.87
c Expenditures made prior to August 3, 1886	577,231.67
d Expenditures made prior to August 3, 1886	599,850.53
e Expenditures made prior to March 3, 1887	1,482,900.79
Total	4,264,451.32

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Statement showing the name and tonnage of each uncompleted vessel authorized to be built, etc.—Continued.

Name.	Estimated amount required for completion from June 30, 1891.						Total estimated amount required for completion, including armor, armament, and equipment.	Total cost.
	Bureau Construction and Repair.	Bureau Steam Engineering.	Hull armor.	Armament.		Bureau Equipment.		
				Gun protection.	Guns, etc.			
Maine	$486,111.00	$286,950.00	$344,850.00	$329,450.00	$236,710.00	$89,000.00	$1,773,071.00	$3,549,041.75
Texas	570,000.00	365,210.00	183,700.00	428,450.00	227,898.00	91,000.00	1,866,258.00	3,002,692.29
Monterey	543,252.00	192,363.00	218,900.00	156,750.00	81,008.00	35,250.00	1,227,523.00	2,596,086.78
New York	1,025,750.00	360,550.00	133,650.00	392,150.00	180,481.00	35,725.00	2,628,306.00	4,038,408.07
Cruiser No. 6	1,067,872.00	479,568.00	14,850.00	110,000.00	248,460.00	41,000.00	1,961,750.00	2,387,969.43
Cincinnati	600,223.00	448,980.00	.....	33,000.00	114,606.00	65,000.00	1,261,809.00	1,833,388.36
Raleigh	344,996.00	448,980.00	.....	33,000.00	122,856.00	65,000.00	1,014,832.00	1,642,915.74
Cruiser No. 9	167,997.00	154,734.00	.....	14,850.00	130,829.00	29,500.00	497,910.00	851,450.92
Cruiser No. 10	166,977.00	159,507.00	.....	14,850.00	130,829.00	29,500.00	501,663.00	854,156.18
Cruiser No. 11	293,651.00	156,171.00	.....	14,850.00	130,829.00	29,500.00	625,001.00	921,131.67
Gunboat No. 5	150,370.00	81,155.00	.....	11,275.00	75,529.00	25,425.00	343,754.00	474,736.24
Gunboat No. 6	151,070.00	81,155.00	.....	11,275.00	75,529.00	25,425.00	344,454.00	473,005.90
Harbor defense ram	620,317.00	364,461.00	402,050.00	.....	9,460.00	12,100.00	1,408,388.00	1,414,558.14
Indiana	2,388,000.00	735,000.00	601,150.00	884,950.00	783,249.00	101,000.00	5,493,349.00	5,521,252.01
Massachusetts	2,388,000.00	735,000.00	601,150.00	884,950.00	783,249.00	101,000.00	5,493,349.00	5,521,754.96
Oregon	2,554,560.00	738,000.00	601,150.00	884,950.00	783,249.00	101,000.00	5,662,909.00	5,690,865.95
Cruiser No. 12	1,066,400.00	1,235,860.00	17,050.00	52,250.00	159,679.00	105,000.00	2,636,239.00	3,149,214.86
Torpedo boat No. 2	47,000.00	75,000.00	.....	.....	12,100.00	2,750.00	136,850.00	136,850.00
Cruiser No. 13	1,425,000.00	1,230,000.00	17,050.00	52,250.00	171,757.00	105,000.00	3,101,057.00	3,104,355.80
Puritan	448,595.00	7,500.00	366,850.00	249,150.00	445,350.00	64,600.00	1,582,054.00	1,774,823.82
Monadnock	448,350.00	52,770.00	227,700.00	139,700.00	194,317.00	50,400.00	1,113,237.00	1,512,297.87
Amphitrite	267,999.00	7,667.00	227,700.00	139,700.00	194,317.00	50,400.00	887,783.00	1,218,023.16
Terror	290,269.00	4,380.00	208,450.00	152,350.00	190,810.50	50,400.00	896,659.50	1,402,286.24
Miantonomoh	17,363.00	3,000.00	.....	.....	50,747.00	.....	71,110.00	849,016.89
Total	17,530,122.00	9,003,961.00	4,166,250.00	4,990,150.00	5,533,857.50	1,304,975.00	42,529,315.50	53,920,232.03

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Practice cruiser	193,750.00				58,901.00	21,300.00	278,951.000	336,745.71
Tugboat No. 1	20,760.32					4,450.00	25,210.32	30,888.00
Tugboat No. 2	20,760.32					4,450.00	25,210.32	30,888.00
Tugboat No. 3	20,760.32					4,450.00	25,210.32	30,888.00
Total	62,280.96					13,350.00	75,630.96	110,664.00
Grand total	17,786,152.96	9,008,961.00	4,166,250.00	4,990,150.00	5,592,758.50	1,239,625.00	42,878,897.46	54,367,691.74

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The above table includes not only the cost of hull, machinery, armor, and battery of the new ships, but everything in their permanent outfit or equipment, such as boats, furniture, cooperage, blocks, masts and spars, galleys, rigging, sails, awnings, guns, gun-carriages and their appurtenances, torpedo tubes, everything, in short, that can be considered as belonging to the general equipment of the ship. It does not include the perishable articles of outfit which are expended in use, such as stores, provisions, paints, oils, and ammunition. It also includes all expenditures under the head of designing, drafting, and other office work, model-making, compensation of weighers and other assistants to inspecting officers, which, although forming actually no part of the cost of the ship, have been distributed under the system of bookkeeping in the Department among the different vessels and included in the above table in order that every item of expenditure, however remotely connected with the actual cost of building, should be set forth in the fullest possible manner.

In examining the above statement it will be seen that the cost of building the new ships of the Navy, excluding tugs, from beginning to final completion, covering operations from the fiscal year 1883–'84 to 1894–'95, aggregates, during the twelve years, a total of $69,993,382, or considerably less than $6,000,000 a year. The vessels included in this statement are forty in number, with an aggregate tonnage of 155,820 tons.

When it is considered that at the time of beginning the first four cruisers not a single steel ship had been built in this country, that no vessels either of steel or of iron had been constructed by the Navy since the war, with the exception of three small third-class iron gunboats built in 1874, and that the whole work upon these ships represented practically a new branch of manufacture, the stupendous character of the results accomplished may be appreciated. For the mechanical work actually done, the figures are reasonable; while the moral result, which has been to raise this country from a position of absolute defenselessness to that of a respectable naval power, has been out of all proportion to the annual charge upon the revenues. No other expenditure of the Government, of equal amount, during the period has been more productive of benefit than that which has been devoted to the construction of an American Navy, out of American materials, and by American labor.

ESTIMATES AND APPROPRIATIONS.

The general estimates for the support of the Navy, including public works and the Marine Corps, which were sent in last year, showed a reduction, as stated in the report of that year, of over $1,000,000 below the estimates of the previous year.

The estimates for the same purpose herewith transmitted show a further reduction of $241,053 below the estimates of last year, and a reduction of $5,360.98 below the appropriations for the current year.

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The present estimates for increase of the Navy show a very large reduction below the appropriations for the current year, the amount being $12,280,855, against $17,607,000 in the last appropriation, a reduction of $5,326,145.

The total estimate for the Navy, including both running expenses and "increase of the Navy," is $27,194,639.80, as against the appropriation of $32,526,145,78 of last year, being an aggregate reduction in current estimates below the last year's appropriation of $5,331,505.98.

The appropriations for the increase of the Navy since July, 1889, have been unusually large as compared with those of previous years. As was indicated, however, in the report of last year, the necessity for these appropriations has been due to the fact that the burden has fallen upon these years of carrying a part, and in some cases by far the largest part, of the construction of every vessel which has been authorized by Congress since 1884.

Comparative exhibit of estimates and appropriations, 1892 and 1893.

Detailed objects of expenditure and explanations.	Estimates, 1892.	Appropriations for 1892-'93 (current year).	Estimates, 1893.	Total.
General establishment:				
Pay of the Navy	$7,314,742.00	$7,300,000.00	$7,350,000.00	
Pay miscellaneous	240,000.00	240,000.00	240,000.00	
Contingent Navy	7,000.00	7,000.00	7,000.00	
				$7,597,000.00
Bureau of Yards and Docks:				
Ordinary expenses	692,720.46	680,412.37	718,794.04	
Public works	523,375.13	769,137.95	469,659.38	
				1,188,453.42
Bureau of Navigation:				
Ordinary expenses	135,750.00	148,000.00	131,750.00	
Naval Academy	213,982.45	213,073.45	207,688.65	
				339,438.65
Bureau of Equipment	1,044,025.00	994,025.00		1,034,225.00
Bureau of Ordnance	480,041.25	389,824.00		594,041.25
Bureau of Construction	1,019,972.50	1,044,972.50		1,019,972.50
Bureau of Steam Engineering	789,105.00	712,900.00		763,105.00
Bureau of Provisions and Clothing	1,242,581.09	1,207,581.09		1,232,692.03
Bureau of Medicine and Surgery	140,500.00	125,000.00		125,000.00
Marine Corps:				
Pay department	707,726.76	696,296.28	696,625.00	
Quartermaster department	308,829.47	254,234.14	263,906.28	
				960,531.28
Naval Observatory	*294,487.20	136,689.00		59,325.67
Total running expenses	15,154,837.81	14,919,145.78		14,913,784.80
Increase Navy:				
Bureau Yards and Docks	200,000.00	100,000.00	110,000.00	
Bureau of Equipment	400,000.00	400,000.00	600,000.00	
Bureau of Ordnance	4,158,850.00	4,000,000.00	4,186,250.00	
Bureau of Construction and Repairs	8,855,433.00	13,107,000.00	7,384,605.00	
Bureau of Steam Engineering	4,856,946.00			
				12,280,855.00
Total increase Navy	18,471,229.00	17,607,000.00		
Grand total	33,626,066.81	32,526,145.78		27,194,639.80

* Supplementary estimate.

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Appropriations, expenditures, and balances, fiscal year ending June 30, 1891.

	Appropriations for fiscal year ending June 30, 1891.	Amount drawn fiscal year ending June 30, 1891.	Balances undrawn June 30, 1891.	Balances undrawn Oct. 31, 1891.
Pay of the Navy	$7,250,000.00	$6,175,210.00	$1,074,790.00	$754,062.28
Pay, miscellaneous	240,000.00	233,350.38	6,649.62	5,898.28
Contingent, Navy	7,000.00	3,456.89	3,543.11	920.85
Pay of the Marine Corps	687,471.79	591,268.19	96,203.60	75,473.20
Marine Corps:				
Provisions	69,137.72	64,713.89	4,423.83	3,782.69
Clothing	75,000.00	74,416.14	583.86	1,167.89
Fuel	20,000.00	19,958.35	41.65	1,647.02
Military stores	12,000.00	12,000.00	.....	15.64
Transportation and recruiting	12,000.00	10,540.08	1,459.92	1,088.45
Repairs of barracks	18,850.00	18,849.12	.88	.88
Forage	3,500.00	3,434.23	65.77	65.77
Hire of quarters	6,024.00	6,023.20	.80	.80
Contingent	27,500.00	27,473.57	26.43	25.45
Naval Academy:				
Pay, Naval Academy	104,217.45	104,217.45	.....	101.01
Special course	5,000.00	1,700.62	3,299.38	2,753.33
Repairs	21,000.00	16,795.98	4,204.02	1,155.09
Heating and lighting	17,000.00	14,781.18	2,218.82	154.70
Furniture for cadet quarters	6,500.00	4,859.00	1,641.00	1,145.50
Contingent	41,800.00	35,641.41	6,158.59	1,102.61
Navigation:				
Transportation and recruiting, Navy	30,000.00	25,680.35	4,319.65	345.39
Contingent	15,000.00	3,032.42	11,967.58	5,256.79
Gunnery exercises	6,000.00	4,115.36	1,884.64	509.28
Naval training station	14,000.00	9,829.67	4,170.33	1,502.35
Naval war college and torpedo school	10,000.00	97.85	9,902.15	9,610.82
Ordnance:				
Ordnance and ordnance stores	144,000.00	117,184.88	26,815.12	14,218.81
Repairs	15,000.00	11,893.06	3,106.94	1,042.10
Torpedo station	60,000.00	42,447.24	17,552.76	5,781.32
Civil establishment	26,624.00	25,370.10	1,253.90	1,303.21
Contingent	8,000.00	5,994.33	2,005.67	17.80
Equipment of vessels	910,000.00	676,062.27	233,937.73	28,793.61
Civil establishment, equipment	19,025.00	19,024.91	.09	.30
Contingent, equipment	10,000.00	6,521.14	3,478.86	462.11
Maintenance, yards and docks	230,000.00	201,881.32	28,118.68	5,454.85
Civil establishment, yards and docks	53,986.04	52,876.12	1,109.92	1,299.93
Contingent, yards and docks	20,000.00	17,394.38	2,605.62	727.30
Repairs and preservation at navy-yards	250,000.00	235,679.58	14,320.42	4,021.70
Naval Home, Philadelphia, Pa	73,915.00	58,277.77	15,637.23	6,510.82
Medical department	60,000.00	52,281.33	7,718.67	6,280.53
Repairs, medicine and surgery	20,000.00	17,134.94	2,865.06	50.27
Contingent, medicine and surgery	25,000.00	20,766.72	4,233.28	1.40
Provisions, Navy	1,066,000.00	924,862.54	141,137.46	12,440.05
Civil establishment provisions and clothing	67,532.03	67,457.50	74.53	190.42
Contingent, provisions and clothing	40,000.00	37,165.65	2,834.35	890.28
Construction and Repair	1,000,000.00	934,061.51	65,938.49	21,284.24
Civil establishment, construction and repair	19,9 2.50	19,247.91	7?4.59	1,005.09
Steam machinery	650,000.00	570,79 .30	79,200.70	36,066.47
Civil establishment, steam engineering	11,900.00	11,755.22	144.78	144.78
Contingent, steam engineering	1,000.00	756.30	243.70	26.02
Total	13,481,555.53	11,588,941.35	1,892,614.18	1,015,799.48

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As will be seen from the foregoing exhibit—

The amount of appropriations for the current expenses of the fiscal year 1891, including $43,500 for buildings and grounds, Naval Academy, was June 30, 1890		$13,525,055.53
The Treasury Department having decided that the appropriation for buildings and grounds, Naval Academy, was specific in character, by direction of said Department it was transferred on the 23d March, 1891, from appropriation 1891 to appropriation without year		43,500.00
Making the amount of available appropriations for 1891		13,481,555.53
Drawn by requisition to June 30, 1891		11,588,941.35
Balance undrawn July 1, 1891		1,892,614.18
Drawn by requisition from July 1 to October 31, 1891		876,814.70
Balance undrawn November 1, 1891		1,015,799.48
In hands of pay officers November 1, 1891		1,419.11
Apparent available balance		1,017,218.59
There is chargeable to this balance the following sums:		
Due from pay of the Navy to officers and men	$708,107.67	
Due from pay of the Marine Corps to officers and men	21,730.40	
Due from ordnance and ordnance stores for outstanding liabilities	12,000.00	
Due from equipment of vessels for outstanding liabilities.	25,000.00	
Due from construction and repair for outstanding liabilities	15,000.00	
Due from steam machinery for outstanding liabilities	30,000.00	
Due from other appropriations for outstanding liabilities.	28,500.00	
Due to clothing and small stores fund	50,407.18	
		890,745.25
Available balance		126,473.34

This balance may be decreased when all the accounts pertaining to the fiscal year have been finally adjusted.

SALE OF GOVERNMENT PROPERTY AND MISCELLANEOUS RECEIPTS.

From a statement prepared by the Fourth Auditor of the Treasury, a copy of which will be found in the appendix to this report, it appears that the deposits in the Treasury from November 1, 1890, to November 1, 1891, on account of sales of Government property, under the control of the Navy Department, amounted to $235,016.97, of which the sum of $149,310.78 was covered into the Treasury as miscellaneous receipts, and the remainder, $85,706.19, credited various appropriations, in accordance with the provisions of section 3618 of the Revised Statutes and the acts of March 3, 1875, and June 20, 1878. The net sum realized from the sale of condemned vessels, $78,137.36 during that period, is embraced in the Auditor's statement; also gains on bills of exchange, in-

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terest, rents from public property and the values of work performed for, or articles supplied to, other departments of the Government, and receipts from all other sources than the sale of condemned materials.

Since the last annual report of the Department the following-named vessels, condemned as unfit for further service and stricken from the Navy Register in pursuance of the act of August 5, 1882, have been sold, after appraisement and advertisement, by sealed proposals, in accordance with the act of March 3, 1883, viz: the *Juniata*, *Brooklyn*, *Ossipee*, *Quinnebaug*, *Saugus* (monitor), tugs *Pilgrim* and *Rescue*, the wrecks of the tug *Triana* and steamer *Despatch*. The total sum received for these vessels was $79,763, being $26,463 in excess of their appraised value, from which the cost of advertising $1,498.60 was paid. The net sum $78,264.40 has been covered into the Treasury as miscellaneous receipts. A detailed statement of the sales and the disposition of the proceeds will be found in the appendix to the report.

The steamer *Tallapoosa* has been surveyed and condemned as unfit for further service, appraised, and ordered to be sold on the South Atlantic Station, as it was deemed unsafe to attempt to bring her to the United States. The *Speedwell*, which was stricken from the Register, was offered for sale, but no offer equal to her appraised value was received.

By the act approved July 2, 1890, the Department was authorized to sell, at a price to be determined by a board of appraisers, an area of 17.83 acres of the navy-yard and United States Naval Hospital lands in the city of Brooklyn, N. Y., provided the city should, within one year from the filing of the report of the board of appraisers, signify its desire to purchase the lands at the price fixed by the board.

On the 5th of September, 1890, Messrs. Andrew J. Perry, Joseph Benjamin, and Hassan H. Wheeler, all of Brooklyn, N. Y., were appointed a board to make the appraisal required by the act. Under date of November 24, 1890, this board filed its report, appraising the value of that portion of the lands designated as United States Naval Hospital lands, viz, 2.46 acres, at $96,579, and the remaining 15.37 acres at $603,421; a total of $700,000.

The authorities of the city of Brooklyn, having decided to purchase the entire area at the price fixed by the board, deposited the sum of $700,000 with the assistant treasurer of the United States at New York, N. Y., to the credit of the Treasurer of the United States, for the purposes of the act, and, under date of November 23, 1891, the sale was concluded and a deed conveying the lands to the city of Brooklyn was duly executed and delivered.

NAVAL OBSERVATORY.

The work on the new Naval Observatory has advanced so far that the transfer from the old to the new site will shortly be undertaken. The

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failure of the contractors has delayed the work of the new building, now in its final stage, but the Government is amply protected, and arrangements are now making under the provisions of the contract by which its early completion may be assured.

When the transfer and installation of the instruments are completed, the Government will be in possession of one of the most admirably equipped observatories in the world. The question of the proper administration of this important charge, representing one of the most important branches of scientific investigation undertaken by the Government, is one that demands early attention. The system in existence hitherto, by which the selection of the Superintendent has been confined to line officers of the Navy, subject like other officers to changes of duty at comparatively short intervals, prevents that continuity of administration which is essential in carrying on the work of a great national observatory. No programme of scientific investigation, especially in the department of astronomy, can be carried out successfully by any institution, if liable to frequent interruptions by a change of its administrative head.

I therefore recommend the adoption of legislation which shall enable the President to appoint, at a sufficient salary, without restriction, from persons either within or outside of the naval service, the ablest and most accomplished astronomer who can be found for the position of Superintendent.

I would also recommend, in view of the era of progress and scientific development upon which the Observatory is now entering, that an advisory council be organized, composed of the Superintendent of the Observatory and its senior professor, and of three other persons of scientific attainments, whose duty it shall be to consider and report upon new instruments and their proper installation; to draw up, with such changes as may be necessary, from time to time the programme of scientific work, including observation, reduction, and publication, and to make such inspections and reports as may be desirable in regard to the character of the work done by the Observatory.

DRY-DOCK COMMISSION.

The commission, to which allusion was made in my last annual report, of which Capt. F. M. Bunce, U. S. N., was president, designated by an executive order of November 22, 1891, in pursuance of a clause in the Naval Appropriation Act of June 30, 1890, to select a suitable site, having due regard to commercial and naval interests, for a dry dock at some point on the shores of the Gulf of Mexico or the waters connected therewith, organized December 5, 1890, completed the duty required, and on the 9th of March last, made their report, which has been recently transmitted to you.

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REVENUE MARINE SERVICE.

The Department again refers to its recommendation, made for two successive years, in favor of legislation consolidating the Revenue Marine Service with the Navy. The advantages of this change are so marked and have been so fully stated in previous reports of Secretaries of the Navy, that it is unnecessary to repeat them here. The measure is advantageous from every point of view, and is again earnestly commended to the attention of Congress.

B. F. TRACY,
Secretary of the Navy.

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APPENDIX.—ESTIMATES, CONTRACTS, ETC., SECRETARY'S OFFICE.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Navy Department.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES, OFFICE SECRETARY OF THE NAVY.			
Secretary, Mar. 3, 1891	$8,000.00		
Assistant Secretary (same act)	4,500.00		
Chief clerk (same act)	2,500.00		
Clerk to the Secretary (same act)	2,250.00		
Disbursing clerk (same act)	2,250.00		
Two clerks of class four (same act)	3,600.00		
One clerk of class four, in charge of files and records (same act)	1,800.00		
Two clerks of class three (same act)	3,200.00		
One stenographer (same act)	1,600.00		
One stenographer (same act)	1,400.00		
One clerk of class two (same act)	1,400.00		
Four clerks of class one (same act)	4,800.00		
One clerk (same act)	1,000.00		
One telegraph operator (same act)	1,000.00		
One carpenter (same act)	900.00		
Two messengers, at $840 each (same act)	1,680.00		
Three assistant messengers, at $720 each (same act)	2,160.00		
Two messenger boys, at $420 each (same act)	840.00		
One messenger boy (same act)	360.00		
One laborer (same act)	660.00		
One clerk of class two for inspection board (same act)	1,400.00		
One laborer for inspection board (same act)	660.00		
One clerk of class one for examining and retiring board (same act)	1,200.00		
		$49,160.00	$49,160.00
CONTINGENT EXPENSES, NAVY DEPARTMENT.			
Stationery, furniture, newspapers, plans, drawings, drawing materials, horses and wagons, freight, expressage, postage, and other absolutely necessary expenses of the Navy Department and its various bureaus and offices (Mar. 3, 1891; vol. 26, p. 934)		15,000.00	15,000.00
SALARIES, OFFICE OF JUDGE-ADVOCATE-GENERAL.			
Chief clerk (in lieu of one clerk of class four). (Mar. 3, 1891)	1,800.00		
One clerk of class four (same act)	1,800.00		
One clerk of class three (same act)	1,600.00		
One clerk of class three (submitted)	1,600.00		
One clerk of class two (Mar. 3, 1891)	1,400.00		
Two clerks of class one (same act)	2,400.00		
One clerk (same act)	1,000.00		
One laborer (same act)	660.00		
		12,260.00	10,660.00
LIBRARY OF THE NAVY DEPARTMENT.			
Salaries:			
One clerk, at $1,000 (Mar. 3, 1891)	1,000.00		
One assistant messenger, at $720 (same act)	720.00		
One laborer, at $660 (same act)	660.00		
		2,380.00	2,380.00
For professional books and periodicals for the library	1,000.00	1,000.00	1,000.00
OFFICE OF THE NAVAL WAR RECORDS OF THE REBELLION.			
Salaries:			
Two clerks of class four (Mar. 3, 1891)	3,600.00		
One clerk of class three (same act)	1,600.00		
Two clerks of class two (same act)	2,800.00		
Two clerks of class one (same act)	2,400.00		
One clerk, at $1,000 (same act)	1,000.00		
Two copyists, $900 each (same act)	1,800.00		
Four copyists, at $720 each (same act)	2,880.00		
Necessary traveling expenses for collection of records (same act)	600.00		
		16,680.00	16,680.00
Additional estimates: For beginning the publication of the official records of the war of the rebellion, both of the Union and the Confederate navies (submitted)	1,500.00	1,500.00	

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Estimates of appropriations required for the service of the fiscal year, etc.—Continued.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES, OFFICE OF NAVAL INTELLIGENCE.			
One clerk of class two (submitted)		$1,400.00	
PAY OF THE NAVY.			
Pay of officers on sea duty; officers on shore and other duty; officers on waiting orders; officers on the retired list; clerks to commandants of yards and stations; clerks to paymasters at yards and stations; general storekeepers; receiving ships and other vessels; extra pay to men reenlisting under honorable discharge; interest on deposits by men; pay of petty officers, seamen, landsmen, and boys, including men in the engineers' force and for the Coast Survey service and Fish Commission, 7,500 men and 750 boys, at the pay prescribed by law. R. S., p. 246, sec. 1307; p. 248, sec. 1386–8; p. 265, sec. 1556; p. 269, secs. 1569, 1573; p. 272, sec. 1595, May 12, 1879, Vol. 21, p. 3, sec. 1; Aug. 5, 1882, Vol. 22, p. 285–7, sec. 1; Mar. 3, 1883, Vol. 22, p. 472–3, sec. 1; Mar. 3, 1885, Vol. 23, p. 340, sec. 1; Mar. 2, 1889, Vol. 25, p. 809, sec. 1; June 30, 1890, Vol. 26, p. 189, sec. 1; Mar. 2, 1891		7,350,000.00	$7,300,000.00
NOTE.—The foregoing estimate is made up as follows:			
Pay of 1,494 officers on the active list	$3,413,450		
Pay of 294 naval cadets under instruction	147,000		
Pay of 378 officers on the retired list	839,804		
Pay of 89 clerks	113,000		
Pay of petty officers, seamen, landsmen, and boys (7,500 men and 750 boys)	2,685,557		
Extra pay of petty officers and seamen, reënlisting under honorable discharge	141,189		
To pay interest on deposits by men, act Feb. 9, 1889	10,000		
Total	7,350,000		
(See detailed statement following.)			
PAY, MISCELLANEOUS, 1893.			
For commissions and interest; transportation of funds; exchange; mileage to officers while traveling under orders in the United States, and for actual personal expenses of officers while traveling abroad under orders, and for traveling expenses of apothecaries, yoemen, and civilian employés, and for actual and necessary traveling expenses of naval cadets while proceeding from their homes to the Naval Academy for examination and appointment as cadets; for rent and furniture of buildings and offices not in navy-yards; expenses of courts-martial, prisoners and prisons and courts of inquiry, boards of investigation, examining boards, with clerks' and witnesses' fees, and traveling expenses and costs; stationery and recording; expenses of purchasing—paymasters' offices of the various cities, including clerks, furniture, fuel, stationery, and incidental expenses; newspapers and advertising; foreign postage; telegraphing, foreign and domestic; telephones; copying; care of library, including purchase of books, photographs, prints, manuscripts, and periodicals; ferriage, tolls, and express fees; costs of suits; commissions, warrants, diplomas, and discharges; relief of vessels in distress; canal tolls and pilotage; recovery of valuables from shipwrecks; quarantine expenses; reports, professional investigation; cost of special instruction, at home or abroad, in maintenance of students and attachés and information from abroad, and the collection and classification thereof, and other necessary incidental expenses; in all (appropriated)		240,000.00	240,000.00
CONTINGENT, NAVY, 1893.			
For all emergencies and extraordinary expenses arising at home or abroad, but impossible to be anticipated or classified, exclusive of personal services in the Navy Department or any of its subordinate bureaus or offices, at Washington, D. C. (appropriated)		7,000.00	7,000.00
PRINTING AND BINDING.			
Printing and binding for the Navy Department, including $12,000 for the Hydrographic Office, to be executed under the direction of the Public Printer		90,000.00	

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Estimate of the amount required to pay the officers of the United States Navy for the fiscal year ending June 30, 1893.

ACTIVE LIST.

No.	Grade.	Sea duty.			Other duty.			Waiting orders.		
		No.	Pay per annum.	Total.	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.
6	Rear-admirals	3	$6,000	$18,000	2	$5,000	$10,000	1	$4,000	$4,000
1	Commodore, chief of bureau	...	...	...	1	5,000	5,000	...	...	...
9	Commodores	2	5,000	10,000	6	4,000	24,000	1	3,000	3,000
2	Captains, chiefs of bureau	...	...	...	2	5,000	10,000	...	...	...
43	Captains	19	4,500	85,500	21	3,500	73,500	3	2,800	8,400
1	Commander, chief of bureau	...	...	...	1	5,000	5,000	...	...	...
85	Commanders	23	3,500	80,500	53	3,000	159,000	8	2,300	18,400
60	Lieutenant-commanders, after 4 years	27	3,000	81,000	26	2,600	67,600	7	2,200	15,400
14	Lieutenant-commanders, first 4 years	6	2,800	16,800	6	2,400	14,400	2	2,000	4,000
211	Lieutenants, after 5 years	107	2,600	278,200	88	2,200	193,600	16	1,800	28,800
39	Lieutenants, first 5 years	22	2,400	52,800	14	2,000	28,000	3	1,600	4,800
50	Lieutenants (junior grade), after 5 years	30	2,000	60,000	18	1,700	30,600	2	1,400	2,800
26	Lieutenants (junior grade), first 5 years	20	1,800	36,000	6	1,500	9,000	...	...	...
103	Ensigns, after 5 years	63	1,400	88,200	36	1,200	43,200	4	1,000	4,000
74	Ensigns, first 5 years	72	1,200	86,400	2	1,000	2,000	...	...	...
76	Naval cadets, undergraduates	73	950	69,350	3	500	1,500	...	...	...
1	Medical director, chief of bureau	...	...	...	1	5,000	5,000	...	...	...
14	Medical directors, after 20 years from date of commission as surgeon	...	...	...	13	4,000	52,000	1	3,000	3,000
4	Medical inspectors, fleet surgeons	4	4,400	17,600	...	...	...	...	...	...
11	Medical inspectors	3	4,200	12,600	7	4,000	28,000	1	3,000	3,000
8	Surgeons, fourth 5 years	3	3,700	11,100	5	3,600	18,000	...	...	...
14	Surgeons, third 5 years	3	3,500	10,500	10	3,200	32,000	1	2,600	2,600
16	Surgeons, second 5 years	7	3,200	22,400	6	2,800	16,800	3	2,400	7,200
12	Surgeons, first 5 years	5	2,800	14,000	7	2,400	16,800	...	...	...
33	Passed assistant surgeons, after 5 years from date of appointment	18	2,200	39,600	14	2,000	28,000	1	1,700	1,700
19	Passed assistant surgeons, first 5 years	12	2,000	24,000	6	1,800	10,800	1	1,500	1,500
1	Assistant surgeon, after 5 years after date of appointment	1	1,900	1,900	...	...	...	...	...	...
34	Assistant surgeons, first 5 years	26	1,700	44,200	8	1,400	11,200	...	...	...
1	Pay director, chief of bureau	...	...	...	1	5,000	5,000	...	...	...
12	Pay directors, after 20 years from date of commission as paymaster	...	...	...	12	4,000	48,000	...	...	...
2	Pay inspectors, fleet paymaster	2	4,400	8,800	...	...	...	...	...	...
11	Pay inspectors, after 20 years	1	4,200	4,200	6	4,000	24,000	4	3,000	12,000
1	Paymaster, fleet	1	4,400	4,400	...	...	...	...	...	...
11	Paymasters, after 20 years	5	4,200	21,000	6	4,000	24,000	...	...	...
10	Paymasters, fourth 5 years	4	3,700	14,800	6	3,600	21,600	...	...	...
9	Paymasters, third 5 years	5	3,500	17,500	2	3,200	6,400	2	2,600	5,200
4	Paymasters, second 5 years	3	3,200	9,600	1	2,800	2,800	...	...	...
5	Paymasters, first 5 years	4	2,800	11,200	1	2,400	2,400	...	...	...
14	Passed assistant paymasters, after 5 years	8	2,200	17,600	6	2,000	12,000	...	...	...
4	Passed assistant paymasters, first 5 years	2	2,000	4,000	2	1,800	3,600	...	...	...
11	Assistant paymasters, after 5 years	8	1,900	15,200	3	1,600	4,800	...	...	...
1	Chief engineer, chief of bureau	...	...	...	1	5,000	5,000	...	...	...
4	Chief engineers, fleet engineers	4	4,400	17,600	...	...	...	...	...	...
24	Chief engineers, after 20 years	3	4,200	12,600	20	4,000	80,000	1	3,000	3,000
6	Chief engineers, fourth 5 years	4	3,700	14,800	2	3,600	7,200	...	...	...
14	Chief engineers, third 5 years	4	3,500	14,000	9	3,200	28,800	1	2,600	2,600
12	Chief engineers, second 5 years	5	3,200	16,000	7	2,800	19,600	...	...	...
9	Chief engineers, first 5 years	3	2,800	8,400	6	2,400	14,400	...	...	...
27	Passed assistant engineers, fourth 5 years	15	2,700	40,500	10	2,350	23,500	2	1,950	3,900
14	Passed assistant engineers, third 5 years	6	2,450	14,700	8	2,250	18,000	...	...	...
13	Passed assistant engineers, second 5 years	9	2,200	19,800	4	2,000	8,000	...	...	...
11	Passed assistant engineers, first 5 years	8	2,000	16,000	2	1,800	3,600	1	1,500	1,500

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Estimate of the amount required to pay the officers of the United States Navy for the fiscal year ending June 30, 1893—Continued.

ACTIVE LIST—Continued.

No.	Grade.	Sea duty.			Other duty.			Waiting orders.		
		No.	Pay per annum.	Total.	No.	Pay per annum.	Total.	No.	Pay per annum.	Total.
45	Assistant engineers, after 5 years	18	$1,900	$34,200	26	$1,600	$41,600	1	$2,000	$2,000
14	Assistant engineers, first 5 years	9	1,700	15,300	5	1,400	7,000	....	.....	.....
20	Chaplains, after 5 years	14	2,800	39,200	5	2,300	11,500	1	1,900	1,900
4	Chaplains, first 5 years	2	2,500	5,000	....	.....	.....	2	1,600	3,200
7	Professors of mathematics, after 15 years	....	.....	.....	7	3,500	24,500	....	.....	.....
3	Professors of mathematics, third 5 years	....	.....	.....	3	3,000	9,000	....	.....	.....
.....	Professor of mathematics, second 5 years	....	.....	.....	....	.....	.....	....	.....	.....
2	Professor of mathematics, first 5 years	....	.....	.....	2	2,400	4,800	....	.....	.....
1	Chief constructor, chief of bureau	....	.....	.....	1	5,000	5,000	....	.....	.....
5	Naval constructors, fourth 5 years	....	.....	.....	5	4,000	20,000	....	.....	.....
6	Naval constructors, first 5 years	....	.....	.....	6	3,200	19,200	....	.....	.....
.....	Assistant naval constructors, after 8 years from date of commission	....	.....	.....	....	.....	.....	....	.....	.....
6	Assistant naval constructors, second 4 years	....	.....	.....	6	2,200	13,200	....	.....	.....
8	Assistant naval constructors, first 4 years	....	.....	.....	8	2,000	16,000	....	.....	.....
4	Civil engineers, after 15 years	....	.....	.....	4	3,500	14,000	....	.....	.....
5	Civil engineers, third 5 years	....	.....	.....	5	3,000	15,000	....	.....	.....
1	Civil engineer, first 5 years	....	.....	.....	1	2,400	2,400	....	.....	.....
26	Boatswains, after 12 years from date of appointment	14	1,800	25,200	12	1,600	19,200	....	.....	.....
.....	Boatswains, fourth 3 years	....	.....	.....	....	.....	.....	....	.....	.....
2	Boatswains, third 3 years	....	.....	.....	2	1,300	2,600	....	.....	.....
5	Boatswains, second 3 years	4	1,400	5,600	1	1,000	1,000	....	.....	.....
1	Boatswain, first 3 years	....	.....	.....	1	900	900	....	.....	.....
41	Carpenters, after 12 years	15	1,800	27,000	26	1,600	41,600	....	.....	.....
.....	Carpenters, fourth 3 years	....	.....	.....	....	.....	.....	....	.....	.....
2	Carpenters, third 3 years	2	1,400	2,800	....	.....	.....	....	.....	.....
1	Carpenter, second 3 years	1	1,300	1,300	....	.....	.....	....	.....	.....
24	Sailmakers, after 12 years	12	1,800	21,600	12	1,600	19,200	....	.....	.....
.....	Sailmakers, fourth 3 years	....	.....	.....	....	.....	.....	....	.....	.....
.....	Sailmakers, third 3 years	....	.....	.....	....	.....	.....	....	.....	.....
1	Sailmaker, second 3 years	1	1,300	1,300	....	.....	.....	....	.....	.....
25	Gunners, after 12 years	11	1,800	19,800	14	1,600	22,400	....	.....	.....
.....	Gunners, fourth 3 years	....	.....	.....	....	.....	.....	....	.....	.....
2	Gunners, third 3 years	1	1,400	1,400	1	1,300	1,300	....	.....	.....
6	Gunners, second 3 years	5	1,300	6,500	1	1,000	1,000	....	.....	.....
3	Gunners, first 3 years	2	1,200	2,400	1	900	900	....	.....	.....
28	Mates	19	900	17,100	9	700	6,300	....	.....	.....
1,494	Total	793	.....	1,689,050	641	.....	1,577,300	60	.....	147,100

Total pay of 1,494 officers on the active list	$3,413,450
Pay for 294 naval cadets (under instruction at Naval Academy), at $500 per annum	147,000
Aggregate	3,560,450

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Estimate of the amount required to pay the officers of the United States Navy for the fiscal year ending June 30, 1893—Continued.

RETIRED LIST.

Grade.	No.	Pay per annum.	Total.
Rear-admiral	1	$6,000	$6,000
Rear-admirals	37	4,500	166,500
Commodores	8	3,750	30,000
Do	2	2,625	5,250
Captains	4	3,375	13,500
Do	2	2,625	5,250
Do	1	2,250	2,250
Do	2	1,950	3,900
Do	1	900	900
Commanders	8	2,625	21,000
Do	1	2,100	2,100
Do	1	1,750	1,750
Do	1	1,400	1,400
Do	1	1,300	1,300
Lieutenant-commanders	7	2,250	15,750
Do	9	2,100	18,900
Lieutenant-commander	1	1,950	1,950
Do	1	1,500	1,500
Do	1	1,350	1,350
Lieutenant-commanders	2	1,100	2,200
Lieutenant-commander	1	700	700
Lieutenants	23	1,950	44,850
Do	4	1,800	7,200
Do	2	1,200	2,400
Do	3	900	2,700
Lieutenants (junior grade)	6	1,500	9,000
Do	5	1,350	6,750
Do	3	900	2,700
Lieutenant, (junior grade)	1	700	700
Ensigns	9	1,050	9,450
Do	2	600	1,200
Ensign	1	500	500
Do	1	300	300
Ensigns	2	900	1,800
Medical director	1	3,750	3,750
Medical directors	12	3,300	39,600
Do	3	3,150	9,450
Medical inspectors	7	3,300	23,100
Surgeons	3	2,625	7,875
Do	4	2,400	9,600
Surgeon	1	2,100	2,100
Passed assistant surgeons	7	1,650	11,550
Passed assistant surgeon	1	1,100	1,100
Assistant surgeons	3	1,425	4,275
Do	2	1,275	2,550
Assistant surgeon	1	850	850
Pay director	1	3,750	3,750
Pay directors	9	3,300	29,700
Pay inspectors	3	3,300	9,900
Paymaster	1	3,150	3,150
Paymasters	2	2,625	5,250
Paymaster	1	2,400	2,400
Do	1	1,400	1,400
Passed assistant paymaster	1	1,650	1,650
Do	1	1,500	1,500
Assistant paymaster	1	1,425	1,425
Do	1	600	600
Chief engineer	1	3,750	3,750
Chief engineers	15	3,300	49,500
Do	2	2,625	5,250
Chief engineer	1	2,550	2,550
Do	1	2,400	2,400
Passed assistant engineers	3	2,025	6,075
Do	6	1,838	11,028
Do	14	1,650	23,100
Passed assistant engineer	1	1,500	1,500
Passed assistant engineers	4	1,275	5,100
Do	2	1,100	2,200
Passed assistantengineer	1	850	850
Do	1	400	400
Assistant engineers	15	1,425	21,375
Do	3	1,567	4,701
Do	6	1,275	7,650
Assistant engineer	1	950	950
Assistant engineers	2	850	1,700
Assistant engineer	1	600	600
Do	1	500	500

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Estimate of the amount required to pay the officers of the United States Navy for the fiscal year ending June 30, 1893—Continued.

Grade.	No.	Pay per annum.	Total.
Chaplains	5	$2,100	$10,500
Professor of mathematics	3	2,625	7,875
Naval constructor	1	3,750	3,750
Do	1	3,375	3,375
Naval contractors	2	3,150	6,300
Naval contractor	1	1,950	1,950
Civil engineer	1	3,250	3,250
Boatswains	16	1,350	21,600
Boatswain	1	600	600
Gunners	22	1,350	29,700
Carpenters	10	1,350	13,500
Sailmaker	12	1,350	16,200
Do	1	500	500
Total	378	.....	339,804

Number of clerks and their pay allowed to commandants of yards and stations; to paymasters of yards, to general storekeepers, and on receiving ships and cruising vessels.

Number and designation.	Where employed.	Pay.
One first clerk to commandant	Navy-yard, Portsmouth, N. H	$1,500
One second clerk to commandant	do	1,200
One clerk to paymaster of yard	do	1,400
One principal clerk to general storekeeper	do	1,300
One first clerk to commandant	Navy-yard, Boston, Mass	1,500
One clerk to paymaster of yard	do	1,600
One principal clerk to general storekeeper	do	1,600
One clerk to paymaster of receiving ship	do	1,600
One first clerk to commandant	Navy-yard, New York, N. Y	1,500
One second clerk to commandant	do	1,200
One clerk to paymaster of yard	do	1,600
One principal clerk to general storekeeper	do	1,600
One clerk to paymaster of receiving ship	do	1,600
One first clerk to commandant	Navy-yard, League Island, Pa	1,500
One second clerk to commandant	do	1,200
One clerk to paymaster of yard	do	1,600
One principal clerk to general storekeeper	do	1,600
One clerk to paymaster of receiving ship	do	1,600
One first clerk to commandant	Navy-yard, Norfolk, Va	1,500
One second clerk to commandant	do	1,200
One clerk to paymaster of yard	do	1,400
One principal clerk to general storekeeper	do	1,300
One clerk to paymaster of receiving ship	do	1,300
One first clerk to commandant	Navy-yard, Washington, D. C	1,500
Two second clerks to commandant, at $1,200 each	do	2,400
One clerk to paymaster of yard	do	1,600
One principal clerk to general storekeeper	do	1,600
One clerk to paymaster of receiving ship	do	1,300
One second clerk to commandant	Navy-yard, Pensacola, Fla	1,200
One clerk to paymaster of yard	do	1,400
One first clerk to commandant	Navy-yard, Mare Island, California	1,800
One second clerk to commandant	do	1,200
One clerk to paymaster of yard	do	1,800
One principal clerk to general stokekeeper	do	1,300
One clerk to paymaster of receiving ship	do	1,800
One clerk to commandant	Naval Station, New London, Conn	1,500
One clerk to paymaster of station	do	1,300
One clerk to commandant	Training Station, Newport, R. I	1,500
One clerk to paymaster of receiving ship	do	1,300
One clerk to paymaster of station	Torpedo Station, Newport, R. I	1,300
One clerk to superintendent	War College, Newport, R. I	1,500
One clerk to commandant	Naval Station, Key West, Fla	1,500
One clerk to paymaster of station	do	1,300
One first clerk to commandant	Naval Academy, Annapolis, Md	1,500
One clerk to cadets' storekeeper	do	1,300
One clerk to general storekeeper	do	1,300
One clerk to commissary	do	1,300
One clerk to paymaster of Academy	do	1,300
One clerk to paymaster of ships	do	1,300
One clerk to commanding officer	Naval Asylum, Philadelphia, Pa	1,500

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Number of clerks and their pay allowed to commandants of yards and stations; to paymasters of yards, to general storekeepers, etc.—Continued.

Number and designation.	Where employed.	Pay.
One clerk to paymaster	Naval Asylum, Philadelphia, Pa	$1,300
One clerk to general inspector pay corps		1,300
Eight clerks to paymasters of flagships, at $1,100 each.		8,800
Seven clerks to paymasters of second-rate ships, at $1,100.		7,700
Twenty-one clerks to paymasters of third-rate training and store ships, at $1,000 each.		21,000
Total		113,000

RECAPITULATION.

Total pay for 1,494 officers on the active list	$3,413,450
Total pay for 204 naval cadets	147,000
Total pay for 378 officers on the retired list	839,804
Total pay of 89 clerks	113,000
	4,513,254

Schedule of bids and statement of contracts awarded and entered into to furnish stationery for the Secretary's office and Bureaus of the Navy Department for the fiscal year ending June 30, 1892.

Name and address of bidder.	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.	Class 7.
Wyckoff, Seamans & Benedict, Washington, D. C						$447.81	$183.15
James J. Chapman, Washington, D. C	$311.53½	$160.21	$110.38	$277.33½			
William Ballantyne & Sons, Washington, D. C	292.51	*152.31	*103.37	*247.77	(†)		
Henry A. Clarke & Son, Washington, D. C						*303.51	*132.30½
Easton & Rupp, Washington D. C	294.21	157.20	105.22	254.04	*$943.38		
Remsburg & Elliott, Washington, D. C							
William H. Teepe, Washington, D. C							
John C. Parker, Washington, D. C							189.50
Rowland A. Robbins, New York, N. Y	*290.05	226.85	129.60	279.67	970.51	466.50	288.25
Rogers Manifold and Carbon Paper Company, New York, N. Y							142.14

Name and address of bidder.	Class 8.	Class 9.	Class 10.	Class 11.	Class 12.	Class 13.	Class 14.
Wyckoff, Seamans & Benedict, Washington, D. C							
James J. Chapman, Washington, D. C							
William Ballantyne & Sons, Washington, D. C	$192.10	*$45.31	$39.37	$44.11	*$229.68		
Henry A. Clarke & Son, Washington, D. C							
Easton & Rupp, Washington, D. C	195.90		39.35		231.92	*$299.05	
Remsburg & Elliott, Washington, D. C							
William H. Teepe, Washington, D. C		49.04½		*39.51			
John C. Parker, Washington, D. C							
Rowland A. Robbins, New York, N. Y	*80.90	52.36	*34.00	56.70	259.20	347.41	*$382.69
Rogers Manifold and Carbon Paper Company, New York, N. Y							

* Contract awarded. † Informal.

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Schedule of bids and statement of contracts awarded and entered into to furnish stationery for the Secretary's office and Bureaus of the Navy Department, etc.—Continued.

Name and address of bidder.	Class 15.	Class 16.	Class 17.	Class 18.	Class 19.	Class 20.	Class 21.
Wyckoff, Seamans & Benedict, Washington, D. C							
James J. Chapman, Washington, D. C				$319.21			
William Ballantyne & Sons, Washington, D. C					$134.49	$108.92	$72.77
Henry A. Clarke & Son, Washington, D. C							
Easton & Rupp, Washington, D. C						106.15	*89.86
Remsburg & Elliott, Washington, D. C				*271.81½			
William H. Teepe, Washington, D. C			*$110.00½			166.80	73.44
John C. Parker, Washington, D. C					*123.42	105.71	
Rowland A. Robbins, New York, N. Y	*$94.61	*$84.77	126.58		124.49	*102.79	81.33
Rogers Manifold and Carbon Paper Company, New York, N. Y							

* Contract awarded. † Informal.

Abstract of offers under advertisement of May 19, 1891, to wash towels for the Navy Department for the fiscal year ending June 30, 1892.

No.	Name of bidder.	Price per hundred.
1	Mary Thomas, 903 First street SW	$1.00
2	Susan Fauntleroy, 486 Locust Place	3.00
3	Edward Campbell, 722 Eleventh street SE	.49½
4	Anna E. Hunter, 823 Ninth street NW	.50
5	Mrs. Alice Plummer, 936 E street SW	1.00

Edward Campbell, the lowest bidder, to whom the award was made June 3, failed to enter into contract. It was then offered to the next lowest bidder, Anna E. Hunter, who declined to execute the contract. The bids of Mary Thomas and Alice Plummer being deemed excessive and Alice Plummer refusing to reduce her bid, the contract was awarded August 15, under an emergency, to Mary Thomas, at the rate of 65 cents a hundred, to which rate she agreed to reduce her bid, her husband, George Thomas, executing the contract.

TABULAR STATEMENT OF PROPOSALS RECEIVED AND OPENED IN THE OFFCE OF THE SECRETARY OF THE NAVY BETWEEN DECEMBER 1, 1890, AND DECEMBER 1, 1891.

[An * marks each successful bid.]

Statement of proposals received and opened December 20, 1890, for the construction of a steel sea-going torpedo boat of about 112 tons displacement (Torpedo Boat No. 2), authorized by act of June 30, 1890. Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with plans and specifications provided by the bidder.

Name and address of bidder.	Price.
Cowles Engineering Co., Brooklyn, N. Y	$119,940
The Herreshoff Manufacturing Co., Bristol, R. I	a 125,000 b 93,200

a 150 tons displacement. b 112 tons displacement.

NOTE.—No award was made under the above proposals.

Proposal received and opened December 20, 1890, for the construction of a harbor-defense ram of about 2,050 tons displacement (Harbor Defense Ram, No. 1), authorized by act of March 2, 1889. Hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy.

Name and address of bidder.	Price.
Bath Iron Works, Bath, Maine*	$990,000

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Under date of October 18, 1890, the Department advertised for proposals, to be opened on the 11th day of February, 1891, for the construction of one swift torpedo cruiser, authorized by the act of June 30, 1890. Proposals were invited in said advertisement under two classes, namely: Proposals for hull and machinery. Class 1, for the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy; and Class 2, for the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder.

No proposals were received in response to the above-mentioned advertisement.

Statement of proposals received and opened April 15, 1891, for steel-gun forgings, under the Department's advertisement of March 16, 1891.

6-INCH B. L. R.

Name and address of bidder.	Price per pound.	Time of delivery.
	Cents.	
Midvale Steel Co., Nicetown, Philadelphia, Pa	35	Within 40 days.
Do.*	30	Within 197 days.
Bethlehem Steel Co., South Bethlehem, Pa	32	Within 4 months.

8-INCH B. L. R.

Midvale Steel Co., Nicetown, Philadelphia, Pa.*	30	Within 197 days.
Bethlehem Steel Co., South Bethlehem, Pa.	30	40-caliber guns within 3 months. 3 35-caliber guns within 7 months.

NOTE.—Under the same advertisement dated March 5, 1891, and to be opened on the same date as the above, proposals were invited for the 2¼-inch steel plates for armored sponsons for cruiser No. 6, to be delivered at the Union Iron Works, San Francisco, Cal., but no bids for said plates were received.

Statement of proposals received and opened April 15, 1891, under advertisement dated March 14, 1891, for furnishing machine tools required by the Bureau of Steam Engineering, to be delivered at the navy-yard, Brooklyn, N. Y.

CLASS A.—TRAVELING CRANES FOR BOILER SHOP.

Name and address of bidder.	If driven by steam.	If driven by electric motor.
Morgan Engineering Co., Alliance, Ohio*	$12,750	*a* $15,250 *b* 19,650
Wm. Sellers & Co., Philadelphia, Pa.	13,175	14,940
Eugene L. Maxwell, New York, N. Y.	.....	*c* 13,725
	.....	*d* 1,840
	.....	*e* 2,994
	.....	*f* 3,826
	.....	*g* 3,356

CLASS B.—TRAVELING CRANES FOR FOUNDRY.

Name and address of bidder.	If driven by steam.		If driven by electric motor.	
	For one crane.	For second crane.	For one crane.	For second crane.
Morgan Engineering Co., Alliance, Ohio	$16,980	$7,775	*a* $17,200 *b* 20,400	*h* $26,850 *h* 31,750
Wm. Sellers & Co., Philadelphia, Pa	14,880	8,600	15,640	9,095
			12,812	6,780
Eugene L. Maxwell, New York, N. Y.*	.....	.....	*d* 1,679	*d* 2,147
			e 2,994	.....
			f 3,826	.....
			g 3,356	.....

a One motor.
b Three motors.
c Crane alone.
d For generating plant to be added to price of cranes.
e For generating plant to be added to price of 2 cranes (1 for boiler shop and 1 for foundry).
f For generating plant to be added to price of 2 cranes (1 for boiler shop and 2 for foundry).
g For generating plant to be added to price of 2 cranes (1 for boiler shop and 1 for foundry, and including 60 horse-power engine).
h For two cranes,

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Statement of proposals received and opened April 15, 1891, under advertisement dated March 14, 1891, etc.—Continued.

CLASS C.—ENGINE LATHE.

Name and address of bidder.	Price.
Niles Tool Works, Philadelphia, Pa	a$16,130
	b17,130
Rowland A. Robbins, New York, N. Y.*	15,250
William Sellers & Co., Philadelphia, Pa	21,100
Eugene L. Maxwell, New York, N. Y	15,700

a Arranged to turn 50 feet.
b Arranged to turn 30 feet and 25 feet at same time.

CLASS D.—HYDRAULIC RIVETER.

Name and address of bidder.	Price.
W. H. Wood, Media, Pa.*	$6,725
Morgan Engineering Co., Alliance, Ohio	7,020
William Sellers & Co., Philadelphia, Pa	a 12,665
	a 10,880
	a 8,300
	a 8,900

a Prices varying according to plans submitted.

Statement of proposals received and opened April 15, 1891, under advertisement dated March 14, 1891, for furnishing machine tools required by the Bureau of Steam Engineering, to be delivered at the navy-yard, Boston, Mass.

CLASS A.—BOILER SHELL DRILLING MACHINE.

Name and address of bidder.	Price.
Eugene L. Maxwell, New York, N. Y.*	$2,470
Thomas H. Dallett & Co., Philadelphia, Pa	2,475

CLASS B.—PUNCHING AND SHEARING MACHINE.

Eugene L. Maxwell, New York, N. Y	$5,300
William Sellers & Co., Philadelphia, Pa	4,360
Hill, Clarke & Co., Boston, Mass	5,275
Niles Tool Works, Philadelphia, Pa.*	3,810

CLASS C.—HYDRAULIC RIVETER AND HOISTING MACHINE.

Name and address of bidder.	Hydraulic riveter.	Hoisting machinery for riveter.	Hoisting machinery with columns, etc.
W. H. Wood, Media, Pa.*	$6,725	$4,525	.....
William Sellers & Co., Philadelphia, Pa	a 12,545	5,460	.....
	a 10,770	.....	.....
	a 8,310	.....	.....
	a 8,780	.....	.....
Morgan Engineering Co., Alliance, Ohio	7,180	5,840	$9,260

a Prices varying according to plans submitted.

CLASS D.—HYDRAULIC FLANGING MACHINE AND HOISTING MACHINERY FOR SAME.

Name and address of bidder.	Hydraulic flanging machine.	Hydraulic hoist for flanging machine.
W. H. Wood, Media, Pa	.....	$725
Morgan Engineering Co., Alliance, Ohio*	$6,850	750

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Statement of proposals received and opened April 15, 1891, under advertisement dated March 14, 1891, etc.—Continued.

CLASS E.—VERTICAL BENDING ROLLS.

Name and address of bidder.	Price.
Eugene L. Maxwell, New York, N. Y	$14,500
S. C. Forsaith Machine Co., Manchester, N. H	12,705
William Sellers & Co., Philadelphia, Pa	11,545
Hill, Clarke & Co., Boston, Mass	14,545
Niles Tool Wooks, Philadelphia, Pa.*	8,200

CLASS F.—HYDRAULIC ACCUMULATOR AND PUMP.

W. H. Wood, Media, Pa	*a* 3,100
Marshall T. Davidson, Brooklyn, N. Y.*	1,075
Morgan Engineering Company, Alliance, Ohio	*b* 2,935

a Accumulator, $1,950; pump, $1,150. *b* Accumulator, $1,825; pump, $1,110.

Statement of proposals received and opened April 29, 1891, under advertisement dated March 14, 1891, for machine tools required by the Bureau of Steam Engineering, to be delivered at the navy-yard, Mare Island, Cal.

CLASS A.—HYDRAULIC FLANGING MACHINE AND ACCUMULATOR; STEAM ACCUMULATOR AND HYDRAULIC HOIST.

Name and address of bidder.	Hydraulic flanging machine.	Hydraulic accumulator and pump.	Steam accumulator.	Hydraulic hoist.
Morgan Engineering Co., Alliance, Ohio	*$9,800	*$3,525	(*a*)	*$825
W. H. Wood, Media, Pa		4,072	(*a*)	1,025

a No bids received.

CLASS B.—VERTICAL BENDING-ROLLS.

Name and address of bidder.	Price.
Niles Tool Works, Hamilton, Ohio*	$10,640
S. C. Forsaith Machine Co., Manchester, N. H	13,415

CLASS C.—ENGINE LATHES.

Name and address of bidder.	36-inch.	24-inch.
Fitchburg Machine Works, Fitchburg, Mass	$2,520	$1,045
The Putnam Machine Co., Fitchburg, Mass	*a* { 1,940 / 2,055	815 / 920
Niles Tool Works, Hamilton, Ohio	1,660	765
Parke & Lacy Co., San Francisco, Cal	*2,485	*1,030
Manning, Maxwell & Moore, New York, N. Y	3,065	1,070
Bement, Miles & Co., Philadelphia, Pa	2,800	1,775

a Prices varying according to plans furnished.

CLASS D.—BAND SAWING MACHINE.

Name and address of bidder.	Price.
Dwight F. Walker, Philadelphia, Pa	$298.60

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Statement of proposals received and opened April 29, 1891, under advertisement dated March 14, 1891, etc.—Continued.

CLASS E.—BOLT-HEADING MACHINE.

Name and address of bidder.	Price.
Niles Tool Works, Hamilton, Ohio*	$1,410
Parke & Lacy Co., San Francisco, Cal	1,675
Manning, Maxwell & Moore, New York, N. Y	1,560
S. C. Forsaith Machine Co., Manchester, N. H	1,537
Dlumis H. McGookin, Philadelphia, Pa	3,900

CLASS F.—BAR-IRON SHEARS.

Niles Tool Works, Hamilton, Ohio	359
Manning, Maxwell & Moore, New York, N. Y.*	340
S. C. Forsaith Machine Co., Manchester, N. H	420

CLASS G.—RADIAL DRILL.

Fitchburg Machine Works, Fitchburg, Mass	1,920
Niles Tool Works, Hamilton, Ohio	1,600
Manning, Maxwell & Moore, New York, N. Y.*	1,489
Bement, Miles & Co., Philadelphia, Pa	2,300

CLASS H.—SLOTTING MACHINE.

The Putnam Machine Co., Fitchburg, Mass	3,012
Niles Tool Works, Hamilton, Ohio	2,620
Bement, Miles & Co., Philadelphia, Pa	3,950

CLASS J.—PLANING MACHINE.

Fitchburg Machine Works, Fitchburg, Mass	1,265
The Putnam Machine Co., Fitchburg, Mass	1,075
Niles Tool Works, Hamilton, Ohio	983
Parke & Lacy Co., San Francisco, Cal.*	940
Powell Planer Co., Worcester, Mass	1,200
Manning, Maxwell & Moore, New York, N. Y	1,438
S. C. Forsaith Machine Co., Manchester, N. H	950
Bement, Miles & Co., Philadelphia, Pa	1,600

CLASS K.—SHAPING MACHINE.

Niles Tool Works, Hamilton, Ohio*	2,246
Fitchburg Machine Works, Fitchburg, Mass	1,550
Wm. H. Warren, Worcester, Mass	4,310
Dwight F. Walker, Philadelphia, Pa	2,498
Bement, Miles & Co., Philadelphia, Pa	3,950

CLASS L.—DRILL PRESS.

Fitchburg Machine Works, Fitchburg, Mass	700
The Putnam Machine Co., Fitchburg, Mass	745
Niles Tool Works, Hamilton, Ohio	790
Manning, Maxwell & Moore, New York, N. Y.*	500
Lodge & Davis Machine Tool Co., Cincinnati, Ohio	650

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Statement of proposals received and opened April 29, 1891, under advertisement dated March 14, 1891, etc.—Continued.

CLASS M.—SCREW MACHINE.

Name and address of bidder.	Price.
Niles Tool Works, Hamilton, Ohio	$1,372.00
Lodge & Davis Machine Co., Cincinnati, Ohio	900.00
S. C. Forsaith Machine Co., Manchester, N. H	730.00
Dwight F. Walker, Philadelphia, Pa.*	699.00
Brown & Sharpe Manufacturing Co., Providence, R. I	738.00

CLASS N.—VERTICAL MILLING MACHINE.

Parke & Lacey Co., San Francisco, Cal	3,400.00
Bement, Miles & Co., Philadelphia, Pa.*	3,000.00

CLASS O.—UNIVERSAL SAW BENCH AND SAW.

Parke & Lacy Co., San Francisco, Cal.*	220.00
Dwight F. Walker, Philadelphia, Pa	249.40

CLASS P.—GRINDING MACHINE.

Parke & Lacy Co., San Francisco, Cal.*	690.00
S. C. Forsaith Machine Co., Manchester, N. H	700.00
Brown & Sharpe Manufacturing Co., Providence, R. I	a 960.00 / 697.00 / 961.00

a Prices varying according to plans furnished.

CLASS Q.—EMERY-WHEEL TOOL GRINDER.

Niles Tool Works, Hamilton, Ohio	148.00
Parke & Lacy Co., San Francisco, Cal.*	75.00
Manning, Maxwell & Moore, New York, N. Y	a 116.00 / 133.00
S. C. Forsaith Machine Co., Manchester, N. H	135.00

a Prices varying according to plans furnished.

Statement of proposals received and opened June 1, 1891, under advertisement dated March 11, 1891, for the construction of a protected cruiser of about 7,350 tons displacement (Cruiser No. 13), authorized by act of March 2, 1891.

CLASS I.—For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy.

The William Cramp & Sons' Ship and Engine Building Company, Philadelphia, Pa.*	$2,745,000
Union Iron Works, San Francisco, Cal	2,793,000
Bath Iron Works (Limited), Bath, Me	2,690,000

CLASS II.—For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder.

No proposals received under Class II.

NOTE.—The Bath Iron Works having failed to establish to the satisfaction of the Secretary of the Navy its ability to comply with the terms of its proposal, as required by the provisions of the act of August 3, 1886, and the William Cramp & Sons' Ship and Engine Building Company having consented to reduce its bid $55,000, the contract for the construction of Cruiser No. 13 was accordingly awarded to that company at $2,690,000.

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Statement of proposals received and opened August 26, 1891, under the Department's advertisement dated July 19, 1891, for the construction of a steel twin-screw sea-going torpedo boat of about, but not less than, 120 tons displacement (Torpedo Boat No. 2), authorized by the act of June 30, 1890.

CLASS I.—For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the Secretary of the Navy.

Cowles Engineering Company, Brooklyn, N. Y $117,490
Iowa Iron Works, Dubuque, Iowa* 113,500

CLASS II.—For the construction of the hull and machinery, including engines, boilers, and appurtenances, complete in all respects, in accordance with the plans and specifications provided by the bidder.

No proposal was received under Class II.

Statement of proposals for steel plates received and opened August 27, 1891, under advertisement dated July 27, 1891.

[Price per pound.]

Name and address of bidder.	Ten 2½-inch.	Eight 2-inch.	Sixteen 1-inch.	Six 1-inch.	Six 1-inch.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Carnegie, Phipps & Co., Pittsburg, Pa. (to be delivered within three months)	12	11	11	11	11

Statement of proposals for rubber washers received and opened August 27, 1891, under advertisement dated July 27, 1891.

[Price per pound.]

Name and address of bidder.	Soft rubber washers.	Hard rubber washers.
S. C. Forsaith Machine Co., Manchester, N. H.	$1.18	$1.18
The B. F. Goodrich Co., Akron, Ohio	*.90	*.65
New Jersey Car-Spring and Rubber Co., Jersey City, N. J.	.65	.55
Spinney, Virtue & Co., Lynn, Mass	1.00	.87½
Melville Lindsay, Washington, D. C [a]	1.75	1.35
	1.60	1.25
	1.20	.00
	1.05	1.85
	.....	.75
	.....	.50
Revere Rubber Co., Boston, Mass	.65	.65

a Prices varying according to samples furnished.

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SALE OF CONDEMNED VESSELS OF THE UNITED STATES NAVY.

The following is a statement as to the sale of certain condemned vessels of the U. S. Navy since the date of the last annual report of the Secretary of the Navy. The vessels were stricken from the Navy Register under authority of the act of August 5, 1882 (Stat. 22, p. 296), and appraised and sold as provided for in the act of March 3, 1883 (Stat. 22, p. 599). The following list gives their names and the dates on which they were stricken from the Navy Register:

Name.	Date.	Name.	Date.
Pilgrim	Apr. 25, 1885	Rescue	Nov. 24, 1890
Quinnebaug	Nov. 20, 1889	Saugus	Do.
Juniata	Do.	Ossipee	Dec. 19, 1890
Brooklyn	Jan. 6, 1890	Triana	Apr. 13, 1891

The following is a copy of the advertisement inviting proposals for the vessels above named, excepting the *Triana:*

PROPOSALS FOR PURCHASE OF VESSELS.

NAVY DEPARTMENT,
Washington, December 22, 1890.

In accordance with the provisions of the fifth section of the act of Congress approved March 3, 1883, sealed proposals will be received at the Navy Department until noon on Wednesday, March 25, 1891, at which time and place they will be opened, for the purchase of certain vessels which have been stricken from the Navy Register, under authority of an act of Congress approved August 5, 1882, and which it is deemed for the best interests of the United States to sell. The vessels offered, their appraised value, and their location, are the *Juniata,* $10,000, Portsmouth, N. H.; *Brooklyn* $11,000, *Ossipee* $13,500, and *Speedwell* (tug) $5,000, Norfolk, Va.; *Pilgrim* (tug) $500, League Island, Philadelphia; *Saugus* (monitor) $800, and *Rescue* (tug) $500, at Washington, and *Quinnebaug* $16,000, at Brooklyn, N. Y. The vessels will be sold for cash to the person or persons or the corporation or corporations offering the highest prices therefor above the appraised value thereof. Proposals must be submitted in a sealed envelope, addressed to the Secretary of the Navy, Washington, D. C., and indorsed "Proposals for the purchase of vessels," so as to distinguish them from other communications. No offer for more than one vessel should be included within one proposal. Each bid or proposal must be accompanied by a deposit in cash (or satisfactory certified check) of not less than 10 per cent of the amount of the offer or proposal, and also a bond with a penal sum equal to the whole amount of the offer, with two or more sureties to be approved by the Secretary of the Navy, conditioned for the payment of the remaining 90 per cent of the amount of such offer or proposal within thirty days from the date of its acceptance. In case default is made in the payment of the remaining 90 per cent, or any part thereof, within that time, said cash deposit of 10 per cent shall be considered as forfeited to the Government, and shall be applied as directed in the act of March 3, 1883. Where a cash deposit or certified check covering the price offered, accompanies the bid, no bond need be furnished. Tie bids will be decided by the Secretary of the Navy by lot. All deposits and bonds of bidders, whose proposals shall not be accepted, will be returned to them within seven days after the opening of the proposals.

On application to the Department forms of bids and bonds which must be used by bidders, also a printed list giving general information concerning the vessels, will be furnished. The vessels can be examined at any time after the 22d proximo by applying to the commandant of the yard where they are. The vessels must be removed by the purchasers from the limits of the yards or stations within such reasonable time as may be fixed by the Department.

B. F. TRACY,
Secretary of the Navy.

All proposals received were publicly opened on the day named in the advertisement, and are shown in the following:

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Schedule of bids for condemned vessels, opened March 25, 1891.

Brooklyn, navy-yard, Norfolk (appraised value, $11,000):

E. J. Butler, Arlington, Mass	$13,128
Lewis Luckenbach, New York	13,000
Charles Sperry, Port Washington, Long Island	12,127

Ossipee, navy-yard, Norfolk (appraised value, $13,500):

Herbert H. Ives, New York	15,315
W. J. Corbett & Co., Boston	14,510
A. Purves & Son, Philadelphia	14,145

Juniata, Portsmouth, N. H. (appraised value, $10,000):

Herbert H. Ives, New York	15,890
W. J. Corbett & Co., Boston	15,200
John Mullen, Boston	14,150
E. J. Butler, Arlington, Mass	13,513
Stephen McKenna, South Boston, Mass	11,777
A. Purves & Son, Philadelphia	11,335
Charles Sperry, Port Washington, Long Island	11,158
G. L. Snow, Rockland, Me	10,300

Quinnebaug, navy-yard, New York (appraised value, $16,000):

Lewis Luckenbach, Brooklyn, N. Y	18,000
E. J. Butler, Arlington, Mass	16,506

Pilgrim, navy-yard, League Island (appraised value, $500):

Matthew Gill, jr., Philadelphia	1,130
J. H. Gregory, Perth Amboy, N. J	1,015
A. Purves & Son, Philadelphia	880
M. H. Gregory, Great Neck, Long Island	821
Fred. Craemer, Camden, N. J	806
L. F. S. Davis, Boston, Mass	777
Edw. Hobbs, Philadelphia	775
Charles Sperry, Port Washington, Long Island	629
A. McKeever, Philadelphia	565

Saugus, navy-yard, Washington (appraised value, $800):

A. V. Kaiser, Philadelphia	15,140
W. J. Corbett & Co., Boston	13,510
A. Purves & Son, Philadelphia	12,565
M. B. Harlow, Alexandria, Va	12,500
E. J. Butler, Arlington, Mass	11,061
John H. Graff, Pittsburg, Pa	10,101
Herbert H. Ives, New York	8,888
M. H. Gregory, Great Neck, Long Island	7,501
Bartlett & Shepherd, Philadelphia	7,445
L. F. S. Davis, Boston, Mass	7,119
Ed. Hobbs, Philadelphia	7,140
Henry F. Hamill, New York	7,120
Charles Sperry, Port Washington, Long Island	5,163
Francis Bannerman, Brooklyn, N. Y	5,125
Harlan & Hollingsworth Co., Wilmington, Del	3,010
John Roney, Baltimore	1,500
J. W. Guider, New York	1,100

Rescue, navy-yard, Washington (appraised value, $500):

A. V. Kaiser, Philadelphia	900
D. Sondheimer, Washington	810
Ed. Hobbs, Philadelphia	800
A. Purves & Son, Philadelphia	735
Cnarles Sperry, Port Washington, Long Island	681
M. H. Gregory, Great Neck, Long Island	610

Speedwell, navy-yard, Norfolk (appraised value, ($5,000):
No bids.

We certify that the above is a correct schedule of the proposals received under the advertisement of December 22, 1890, for the purchase of condemned vessels.

T. D. WILSON, *Chief Constructor,*
Chief of the Bureau of Construction and Repair.
GEO. W. MELVILLE, *Engineer-in-Chief,*
Chief of the Bureau of Steam-Engineering.
JNO. W. HOGG,
Chief Clerk, Navy Department.

NAVY DEPARTMENT, *April 1, 1891.*

Approved.

J. R. SOLEY,
Acting Secretary of the Navy.

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The awards were made to the highest bidder or bidders in each case respectively. No offer was received for the *Speedwell*, stricken from the Register December 19, 1890.

Proposals for the purchase of the *Triana*, stricken from the Register April 13, 1891, were invited by advertisement, of which the following is a copy:

PROPOSALS FOR PURCHASE OF PUBLIC VESSEL.

NAVY DEPARTMENT,
Washington, April 16, 1891.

Under the provisions of the fifth section of the act of Congress approved March 3, 1883, sealed proposals will be received at the Navy Department until noon on Saturday, May 2, 1891, at which time and place they will be opened, for the purchase of the U. S. tug *Triana*, which vessel has been stricken from the Naval Register, under authority of an act of Congress approved August 5, 1882, and which it is deemed for the best interests of the United States to sell. Proposals must be submitted in a sealed envelope, addressed to the Secretary of the Navy, Washington, D. C., and endorsed "Proposal for the purchase of the *Triana*," so as to distinguish them from other communications.

The *Triana* will be sold to the party offering the highest price in cash for her. Each proposal must be accompanied by a cash deposit or certified check for the full amount of such offer or proposal. All deposits with proposals not accepted will be returned to the bidder or bidders within seven days after the opening of the proposals. Tie bids will be decided by the Secretary of the Navy by lot. The *Triana*, apparently a complete wreck, lies on the beach near the Cuttyhunk Life-Saving Station, Vineyard Sound, Massachusetts. Proposals must be for her as she is or may be found when taken possession of by the purchaser.

F. M. RAMSAY,
Acting Secretary of the Navy.

The proposals received were publicly opened on the day named in the advertisement, and are shown in the following schedule:

Thomas Butler & Co., Causeway street, Boston, Mass	$100.00
Dunbar & Davis, 7 Commercial Wharf, Boston, Mass	27.00
B. C. Cromwell, jr., Vineyard Haven, Mass	49.00

T. D. WILSON,
Chief Constructor.
WM. B. REMEY,
Judge-Advocate-General.
JNO. W. HOGG,
Chief Clerk.

NAVY DEPARTMENT,
May 4, 1891.

Approved.

B. F. TRACY,
Secretary of the Navy.

The award was made to the highest bidder.

The following copy of the account current, transmitted with required vouchers, to the Fourth Auditor of the Treasury by the Secretary of the Navy exhibits in detail the receipts from the sale of the several vessels under advertisements of December 22, 1890, and of April 16, 1891, and the disposition of the same:

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B. F. Tracy, Secretary of the Navy, in account current with the United States for proceeds of sales of condemned vessels under public advertisements of December 22, 1890, and April 16, 1891, inviting written proposals, and in pursuance of the acts of August 5, 1882 (22 Stats., page 296, and March 3, 1883, 22 Stats., page 599).

Dr.				Cr.			
1891.	To deposits accompanying the following accepted bids:			1891.			
Mar. 25	From E. J. Butler for the Brooklyn	$1,312.80		Apr. 16	By amount covered into United States Treasury on account miscellaneous receipts.		$14,290.00
25	From H. H. Ives for the Ossipee	1,600.00		17	Do		34,000.00
25	From H. H. Ives for the Juniata	1,600.00		23	Do		14,436.00
25	From Lewis Luckenbach, for the Quinnebaug	1,800.00		27	Do		13,715.00
25	From Matthew Gill, jr., for the Pilgrim	113.00		30	Do		1,017.00
25	From A. V. Kaiser, for the Saugus	1,514.00		May 9	Do		100.00
25	From A. V. Kaiser, for the Rescue	90.00			For publishing advertisements of Dec. 24, 1890:		
			$8,029.80	22	Amount paid Baltimore American ..... No. 1..		84.10
	To balance of purchase money:			22	Amount paid Mail & Express, New York ..... 2..		194.40
Apr. 7	From E. J. Butler, for the Brooklyn	11,815.20		22	Amount paid Chronicle, San Francisco, Cal ..... 3..		146.40
18	From H. H. Ives, for the Juniata	14,290.00		22	Amount paid Press, Philadelphia, Pa ..... 4..		141.60
23	From H. H. Ives, for the Ossipee	13,715.00		22	Amount paid North American, Philadelphia, Pa ..... 5..		104.40
7	From Lewis Luckenbach, for the Quinnebaug	16,200.00		22	Amount paid Press, New York ..... 6..		278.40
25	From Matthew Gill, jr., for the Pilgrim	1,017.00		22	Amount paid Journal, Boston, Mass ..... 7..		58.50
20	From A. V. Kaiser, for the Saugus	13,626.00		22	Amount paid Advertiser, Boston, Mass ..... 8..		88.50
20	From A. V. Kaiser, for the Rescue	810.00		22	Amount paid Tribune, New York ..... 9..		187.20
			71,473.20	22	Amount paid Bulletin, San Francisco, Cal ..... 10..		99.43
May 2	To purchase money for the Triana from Thomas Butler & Co.		100.00	22	Amount paid Chronicle, Portsmouth, N. H ..... 11..		24.77
				22	Amount paid Chronicle, Vallejo, Cal ..... 12..		14.44
					For publishing advertisements of Apr. 16, 1891:		
				22	Amount paid Journal, Boston, Mass ..... 13..		11.25
				22	Amount paid Commercial Bulletin, New York ..... 14..		21.60
				22	Amount paid News, Newport, R. I ..... 15..		5.43
				22	Amount paid Mercury, New Bedford, Mass ..... 16..		2.67
				22	Amount paid Evening Standard, New Bedford, Mass ... 17..		2.55
				25	Amount covered into U. S. Treasury, miscellaneous receipts		579.36
			$79,603.00				79,603.00

NAVY DEPARTMENT, *May 26, 1891.*

B. F. TRACY,
Secretary of the Navy.

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The U. S. S. *Despatch* was stricken from the register October 28, 1891, and proposals invited for her purchase by advertisement of the same date:

PROPOSALS FOR PURCHASE OF PUBLIC VESSEL.

NAVY DEPARTMENT,
Washington, October 28, 1891.

Under the provisions of the fifth section of the act of Congress approved March 3, 1883, sealed proposals will be received at the Navy Department until noon on Tuesday, November 10, 1891, at which time and place they will be opened, for the purchase of the U. S. S. *Despatch*, which vessel has been stricken from the Navy Register, under authority of an act of Congress, approved August 5, 1882, and which it is deemed for the best interests of the United States to sell. Proposals must be submitted in a sealed envelope, addressed to the Secretary of the Navy, Washington, D. C., and indorsed "Proposal for the purchase of the *Despatch*," so as to distinguish them from other communications.

The *Despatch* will be sold to the party offering the highest price in cash for her. Each proposal must be accompanied by a cash deposit or certified check for the full amount of such offer or proposal. All deposits with proposals not accepted will be returned to the bidder or bidders within seven days after the opening of the proposals. Tie bids will be decided by the Secretary of the Navy, by lot. The *Despatch*, a complete wreck, lies on the beach near Assateague light-house, Virginia. Proposals must be for her as she is or may be found when taken possession of by the purchaser.

B. F. TRACY,
Secretary of the Navy.

The following is a schedule of bids received:

No.	Name and address of bidder.	Amount.
1	G. W. Schultz & Co., 308 Walnut street, Philadelphia, Pa	$160.00
2	Charles E. Babbit, Chincoteague, Va	75.00
3	James Thornton, sr., Chincoteague, Va	25.00
4	Thompson C. Gill & Co., Philadelphia, Pa	36.00

The foregoing is a correct schedule of all the proposals received for the purchase of the U. S. S. *Despatch;* opened by the undersigned, by direction of the Department, at 1 p. m. November 10, 1891.

WM. B. REMEY,
Judge-Advocate-General.
JNO. W. HOGG,
Chief Clerk.
M. S. THOMPSON.

NAVY DEPARTMENT, *November 12, 1891.*

Approved:

JAMES R. SOLEY,
Acting Secretary of the Navy.

The Fourth Auditor of the Treasury, in a communication to the Secretary of the Navy, under date of July 2, 1891, advises the Secretary of the Navy that his account for sale of all the vessels (except the *Despatch*) has been allowed and closed, and that there was no balance standing against him.

An account of the sale of the *Despatch* has been transmitted to the Fourth Auditor.

For advertising the sale of the *Despatch* the following bills have been paid, viz:

American, Baltimore, Md	$9.43
Landmark, Norfolk, Va	6.13
Press, Philadelphia, Pa	17.40
	32.96

It will be seen that the total sum received as purchase money from the sale of the nine vessels was $79,763, the cost of advertising, $1,498.60, and the net sum covered into the Treasury in accordance with section 3618 of the Revised Statutes as "Miscellaneous receipts on account of proceeds of public property," $78,264.40.

Respectfully submitted.

JNO. W. HOGG,
Chief Clerk.

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RECEIPTS FROM SALES OF GOVERNMENT PROPERTY.

Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1890, to November 1, 1891.

[Compiled in the Fourth Auditor's office, by direction of the Secretary of the Treasury.]

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1890.							
Nov. 11	United States Treasury	C. Schenck, pay director, U. S. Navy.	200 white hats furnished cadets.		$68.00	$68.00	Bureau of Provisions and Clothing.
19	do	Thos. J. Hobbs, disbursing clerk.	Bronze castings furnished Bureau of Engraving and Printing.		40.70	40.70	Bureau of Ordnance.
Dec. 2	New York	C. A. McDaniel, paymaster, U. S. Navy.	Damaged stores, 70 packages of biscuit.	$128.18		128.18	Bureau of Provisions and Clothing.
5	United States Treasury	E. Putnam, paymaster, U. S. Navy.	Gain on exchange	9.07		9.07	
5	do	L. G. Billings, paymaster, U. S. Navy.	Condemned marine clothing	9.34		9.34	
5	do	O. C. Tiffany, passed assistant paymaster, U. S. Navy.	Gain on exchange	467.80		467.80	
5	do	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned furniture and clothing.	392.63		392.63	
5	San Francisco	H. G. Colby, paymaster, U. S. Navy.	Condemned provisions, clothing, and small stores.	934.22	3,065.78	4,000.00	Bureau of Provisions and Clothing.
16	do	do	Condemned provisons	580.73		580.73	Do.
24	United States Treasury	C. A. McDaniel, paymaster, U. S. Navy.	Gain on exchange and gain on value of yens.	106.35		106.35	
1891.							
Jan. 3	The First National Bank, Newport, R. I.	L. G. Bogg, paymaster, U. S. Navy.	Provisions furnished officers' messes.		301.13	301.13	Bureau of Provisions and Clothing.
6	New York	C. A. McDaniel, paymaster, U. S. Navy.	Condemned stores	33.29		33.29	Bureau of Steam Engineering.
7	do	G. E. Thornton, pay director, U. S. Navy.	Received from Morgan Engineering Co., for work on crane.		257.69	257.69	
9	do	G. H. Griffing, paymaster, U. S. Navy.	Rents at Wallabout	990.00		990.00	
9	Boston	C. W. Abbot, pay director, U. S. Navy.	Dock charges, Boston navy yard.	113.03		113.03	
10	United States Treasury	J. C. Sullivan, passed assistant paymaster, U. S. Navy.	Gain on exchange	10.85		10.85	
16	New York	G. H. Griffing, paymaster, U. S. Navy.	Rents at Wallabout	150.00		150.00	

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26	Philadelphia	G. Cochran, pay inspector, U. S. Navy.	Received from Midvale Steel Co., on account of expenses incurred on 6-inch tube rejected on account of physical test.		122.96	122.96	Bureau of Ordnance.
23	New York	G. H. Griffing, paymaster, U. S. Navy.	Rents at Wallabout	333.00		333.00	
24	Baltimore	J. D. Murray, pay director, U. S. Navy.	Condemned ordnance material, act Mar. 3, 1875.		2,492.49	2,492.49	Bureau of Ordnance.
16	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned clothing and military stores.	22.55		22.55	
28	....do	....do	....do	170.81		170.81	
Feb. 3	....do	....do	Old iron	43.30		43.30	
8	....do	C. W. Littlefield, passed assistant paymaster, U. S. Navy.	Gain on exchange	22.00		22.00	
8	....do	S. Rand, paymaster, U. S. Navy	Condemned marine clothing	6.64		6.64	
8	....do	Seligman Bros., fiscal agents, Navy Department.	Gain on exchange	4,863.06		4,863.06	
5	New York	G. H. Griffing, paymaster, U. S. Navy.	Rents at Wallabout	305.00		305.00	
20	United States Treasury	M. C. McDonald, passed assistant paymaster, U. S. Navy.	Rent of lots, Yokohama	198.17		198.17	
24	....do	J. W. Parsons, disbursing agent.	Coal furnished steamer Bache		122.90	122.90	Bureau of Equipment.
26	....do	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned stores	4.20		4.20	
28	....do	....do	....do	90.15		90.15	
Mar. 2	....do	L. Hunt, assistant paymaster, U. S. Navy.	Gain on exchange	25.00		25.00	
14	....do	Chief Bureau of Ordnance	Material furnished State of Virginia.		24.96	24.96	Bureau of Ordnance.
14	....do	H. A. Gill, disbursing clerk	Coal furnished Fish Commission.		296.40	296.40	Bureau of Ordnance.
	United States Treasury	J. Hoy, pay inspector, U. S. Navy.	Gain on exchange	192.55		192.55	
13	New York	G. H. Griffing, paymaster, U. S. Navy.	Clothing and small stores issued to St. Marys.		206.09	206.09	Bureau of Provisions and Clothing.
27	....do	C. A. McDaniel, paymaster, U. S. Navy.	Condemned stores	2.57		2.57	Bureau of Construction and Repair.
27	....do	....do	....do	54.48		54.48	Bureau of Equipment.
30	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned clothing and furniture.	1.22		1.22	
30	First National Bank, Newport, R. I.	L. G. Boggs, paymaster, U. S. Navy.	Refunded by apprentices at time of discharge for outfits of clothing.		358.24	358.24	Bureau of Provisions and Clothing.
30	....do	....do	Provisions furnished officers' messes.		57.14	57.14	Do.
31	Boston	C. W. Abott, pay director, U. S. Navy.	Dock charges	6.79		6.79	

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Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1890, to November 1, 1891—Continued.

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1891.							
Apr. 8	San Francisco	G. A. Lyon, pay inspector, U. S. Navy.	Received from M. J. Healy & Co. for actual cost of dressing to shape certain blocks of granite, delivered under contract.	.....	$215.02	$215.02	
11	Boston	C. W. Abbot, pay director, U. S. Navy.	Proceeds of ordnance material, act Mar. 3, 1875.	.....	20,000.00	20,000.00	Bureau of Ordnance.
16	United States Treasury	Secretary of the Navy	Condemned vessels, act Mar. 3, 1883.	$14,290.00	.....	14,290.00	
17	do	do	do	34,000.00	.....	34,000.00	
17	Philadelphia	H. M. Denniston, pay director, U. S. Navy.	Rent of wharf property	137.50	.....	137.50	Bureau of Yards and Docks.
23	United States Treasury	Secretary of the Navy	Condemned vessels, act Mar. 3, 1883.	$14,436.00	.....	14,436.00	
27	do	do	do	13,715.00	.....	13,715.00	
27	do	Seligman Bros., special agents, Navy Department.	Interest on credit balance and gain on exchange.	7,180.23	.....	7,180.23	
27	do	H. C. McDonald, passed assistant paymaster, U. S. Navy.	Appreciation on value of yens.	189.37	.....	189.37	
30	do	Secretary of the Navy	Condemned vessels, act Mar. 3, 1883.	1,017.00	.....	1,017.00	
30	do	A. W. Bacon, paymaster, U. S. Navy.	Sale of nautical instruments	2,839.77	.....	2,839.77	Bureau of Navigation.
May 1	New York	G. H. Griffing, paymaster, U. S. Navy.	Proceeds ordnance material, act Mar. 3, 1875.	.....	15,000.00	15,000.00	Bureau of Ordnance.
1	do	do	Value of clothes issued to school ship St. Marys.	.....	362.14	362.14	Bureau of Provisions and Clothing.
9	United States Treasury	Secretary of the Navy	Sale of tug Triana, act Mar. 3, 1883.	100.00	.....	100.00	
11	do	J. S. Phillips, assistant paymaster, U. S. Navy.	Gain on exchange	169.67	.....	169.67	
16	The Norfolk National Bank, Norfolk, Va.	C. W. Slamm, paymaster, U. S. Navy.	Condemned stores	104.13	.....	104.13	Bureau of Medicine and Surgery.
18	New York	G. H. Griffing, paymaster, U. S. Navy.	Expenses of statutory board in connection with sale of of condemned stores, Mar. 10, 1891.	.....	1,182.96	1,182.96	Bureau of Provisions and Clothing.
18	The Norfolk National Bank, Norfolk Va.	C. W. Slamm, paymaster, U. S. Navy.	Proceeds of ordnance material and small arms, acts Mar. 3, 1875, and June 20, 1878.	.....	8,758.32	8,758.32	Bureau of Ordnance.

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20	United States Treasury	H. B. Lowry, quartermaster, U. S. Marine Corps.	Condemned stores	97.45		97.45	
21	New York	G. H. Griffing, paymaster, U. S. Navy.	Rents at Wallabout	240.00		240.00	
20	United States Treasury	T. J. Hobbs, disbursing clerk	Castings furnished Bureau Engraving and Printing.		66.36	66.36	Do.
22	do	J. W. Parsons, disbursing agent.	Payment for one set of braces for the U. S. Coast and Geodetic steamer Patterson.		34.34	34.34	Bureau of Equipment.
28	do	Secretary of the Navy	Condemned vessels, act Mar. 3, 1883.	579.36		579.36	
29	do	H. T. Stancliff, paymaster, U. S. Navy.	Gain on exchange and appreciation of yens.	2,926.74		2,926.74	
29	do	O. C. Tiffany, passed assistant paymaster, U. S. Navy.	Gain on exchange and appreciation on Mexican dollars.	1,678.61		1,678.61	
27	New York	G. H. Griffing, paymaster, U. S. N.	Rents at Wallabout	952.50		952.50	
June 8	do	do	Condemned stores	4,222.58	12,525.38	16,747.96	Bureau Ordnance, act Mar. 3, 1875, $8,176.58.
	do	do	do				Bureau Provisions and Clothing, and small stores fund, $4,348.80.
	do	do	do				Bureau Construction and Repair, $3,020.85.
	do	do	do				Bureau Provisions and Clothing, $1,201.73.
9	Philadelphia	A. D. Bache, paymaster, U. S. N.	do	116.16	8,607.35	8,723.51	Bureau Ordnance, act Mar. 3, 1875, $8,607.35.
	do	do	do				Bureau Construction and Repair, $116.16.
5	San Francisco	J. R. Stanton, paymaster, U. S. N.	Condemned horses and cattle	328.69		328.69	Bureau Yards and Docks.
22	Boston	C. W. Abbot, pay director, U. S. N.	Condemned stores	10,699.34	731.83	11,431.17	Bureau Ordnance, act Mar. 3, 1875. $599.78.
	do	do	do				Bureau Provisions and Clothing, clothing and small stores fund, $132.05.
	do	do	do				Bureau Provisions and Clothing, clothing and small stores fund, $111.53.
	do	do	do				Bureau Construction and Repair, $4,950.01.
	do	do	do				Bureau Yards and Docks, $57.23.
	do	do	do				Bureau Steam Engineering, $115.59.
	do	do	do				Bureau Equipment, $5,464.98.
24	Baltimore	C. Schenck, pay director, U. S. N.	Payment for 1,200 white hats		336.72	336.72	Bureau Provisions and Clothing.
July 1	United States Treasury	W. W. Woodhull, paymaster, U. S. N.	Gain on exchange	7.70		7.70	

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Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1890, to November 1, 1891—Continued.

Date of deposit.	Place of deposit.	[By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount credited to the appropriation.	Total amount deposited.	Remarks.
1891.							
July 3	Boston	C. W. Abbot, pay director, U. S. N.	Docking merchant vessel	$183.25		183.25	
7	United States Treasury	J. W. Parsons, disbursing agent.	Water furnished Bache		$0.56	.56	Bureau Equipment.
10	....do	T. J. Hobbs, disbursing clerk	Castings furnished Bureau Engraving and Printing.		105.59	105.59	Bureau Ordnance.
8	New Orleans	H. T. Skelding, paymaster, U. S. N.	Condemned stores	2,952.52	2,320.90	5,273.42	Bureau Ordnance, act Mar. 3, 1875, $2,320.90.
	....do	....do	....do				Bureau Equipment, $2,592.65.
	....do	....do	....do				Bureau Yards and Docks, $26.09.
	....do	....do	....do				Bureau Construction and Repair, $176.92.
	....do	....do	....do				Bureau Steam Engineering, $156.86.
June 30	New York	R. T. M. Ball, passed assistant paymaster, U. S. N.	....do	52.84		52.84	Bureau Equipment, $33.28.
	....do	....do	....do				Bureau Construction and Repair, $12.91.
	....do	....do	....do				Bureau Steam Engineering, $5.28.
	....do	....do	....do				Bureau Ordnance. $0.59.
	....do	....do	....do				Bureau Medicine and Surgery, $0.78.
July 16	United States Treasury	T. J. Hobbs, disbursing clerk	Castings furnished Bureau Engraving and Printing.		92.99	92.99	Bureau Ordnance.
16	....do	J. W. Parsons, disbursing agent.	75 lbs. of salt-water soap furnished Coast and Geodetic schooner Eagre.		2.82	2.82	Bureau Provisions and Clothing.
17	New York	G. M. Griffing, paymaster, U. S. N.	Expenses of statutory board in connection with sale of June 15, 1891.		207.32	207.32	Do.
24	United States Treasury	Seligman Brothers, fiscal agents, Navy Department.	Interest on daily balances	2,441.50		2,441.50	
24	....do	W. B. Wilcox, assistant paymaster, U. S. N.	Condemned marine clothing and gain on exchange.	161.09		161.09	Gain on exchange, $143.79.
	....do	....do	....do				Marine clothing, $17.30.
31	United States Treasury	Reah Frazer, passed assistant paymaster, U. S. N.	Gain on exchange and increase value of Japanese yens and Mexican dollars.	1,272.85		1,272.85	Gain on exchange, $982.03; value yens and Mexican dollars, $290.82.

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	7	The First National Bank, Newport, R. I.	J. Couvine, passed assistant paymaster, U. S. N.	Provisions furnished officers' messes.	.....	12.55	15.55	Bureau Provisions and Clothing.
Aug.	1	New York	G. H. Griffing, paymaster, U. S. N.	Expenses of statutory board pertaining to sale of June 15, 1891, and rents at Wallabout.	904.75	166.40	1,071.15	Bureau Provisions and Clothing, $166.40.
	4	.....do	.....do	Rents at Wallabout	125.00	.....	125.00	
	6	United States Treasury	H. B. Lowry, quartermaster, U. S. M. C.	Condemned marine clothing	3.52	.....	3.52	
	17	New York	H. T. B. Harris, paymaster, U. S. N.	Condemned stores	17,827.04	5,980.38	23,807.42	Bureau Provisions and Clothing (clothing and small stores fund), $5,688.64.
		.....do	.....do	.....do	.....	.....	.....	Bureau Ordnance, act Mar. 3, 1875, $291.74.
		.....do	.....do	.....do	.....	.....	.....	Bureau Equipment, $5,552.99.
		.....do	.....do	.....do	.....	.....	.....	Bureau Steam Engineering, $6,074.40.
		.....do	.....do	.....do	.....	.....	.....	Bureau Construction and Repair, $3,585.20.
		.....do	.....do	.....do	.....	.....	.....	Bureau Yards and Docks, $2,322.92.
		.....do	.....do	.....do	.....	.....	.....	Bureau Medicine and Surgery, $2.20.
		.....do	.....do	.....do	.....	.....	.....	Bureau Provisions and Clothing, $289.03.
	25	Norfolk National Bank, Norfolk, Va.	C. W. Slamm, paymaster, U. S. N.	Proceeds sale old oil barrels	25.00	.....	25.00	
Sept.	18	United States Treasury	H. B. Lowry, quartermaster, U. S. M. C.	Condemned stores	128.96	.....	128.96	
	28	.....do	T. J. Hobbs, disbursing clerk	Bronze and iron castings furnished Bureau of Engraving and Printing.	.....	63.80	63.80	Bureau Ordnance.
Oct.	3	.....do	H. B. Lowry, quartermaster, U. S. M. C.	Fuel furnished officers	.....	1,475.83	1,475.83	
	8	The First National Bank, Newport, R. I.	J. Couvine, passed assistant paymaster, U. S. N.	Ship's provisions furnished apprentices' messes.	.....	10.64	10.64	Bureau Provisions and Clothing.
	15	United States Treasury	T. J. Hobbs, disbursing clerk	Castings furnished Bureau Engraving and Printing.	.....	31.51	31.51	Bureau Ordnance.
	22	.....do	Seligman Bros., fiscal agents, Navy Department.	Interest on daily balances and gain on exchange.	2,942.68	.....	2,942.68	
		Grand total			149,310.78	85,706.19	235,016.97	

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REPORT

OF THE

CHIEF OF THE BUREAU OF YARDS AND DOCKS.

BUREAU OF YARDS AND DOCKS,
NAVY DEPARTMENT,
Washington, D. C., October 14, 1891.

SIR: I have visited and inspected during the past year all of the navy-yards and stations, except that at Sacketts Harbor.

The appropriation for maintenance, and repairs and preservation, have been so limited for many years past that it has not been possible to provide for necessary repairs or to arrest the deterioration due to time and neglect; unless speedy relief is given many of the public buildings, wharves, and docks will be past repair.

In 1883 a board, created by act of Congress August 5, 1882, of which Rear-Admiral Luce was president, found the then value of buildings, docks, and other improvements pertaining to this Bureau, exclusive of the value of the sites upon which they were situated, to be $33,339,363.24. Since then three docks have been built at a cost of $1,500,000, and other improvements made at a cost of about $1,000,000, to be cared for by this Bureau.

The commandants of the various navy-yards and stations have asked for $461,392.69 under maintenance, and for $817,711.31 under repairs and preservation, to maintain the naval establishments under their command, making a total of $1,279,104. The Bureau has reduced this to a total of $1,000,000, and hopes with this amount in another year to have everything in a creditable condition. The new station on Puget Sound, and the enlarging of the Port Royal station by building a dry dock there, have added to the Bureau's expenses.

I repeat from my report of last year:

There are 14 navy-yards and stations, exclusive of the Naval Home, covering 2,700 acres of ground, with 439 workshops, store and ship houses, 7.18 miles of wharf line, 10 dry docks, 19 marine railways and launching ways, a large number of offices, many miles of railway, of water, gas, and steam pipes, 150 horses and oxen, and 100 houses for officers' residences, to be maintained by this Bureau.

The deterioration upon an unoccupied building or dock is as great, or greater, than when occupied. If these yards and stations are never to be used for naval purposes, true economy would be to sell them. If, however, the Government is to hold on to them for an emergency, sound policy requires that they should be kept in repair. Another reason for increase of expenses of this Bureau is that many improvements incidental to modern ships and a new navy have been made, such as the three new timber dry docks at New York, Norfolk, and League Island; also the growing importance of Port Royal, Key West, and of New London for coaling stations. A dock is being constructed at the former. These make it necessary to have increased appropriations.

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The stone dry dock at Mare Island, Cal., and the dock now being built at Port Royal, S. C., are the only ones that will admit the largest battle-ships at their maximum draft.

It is therefore recommended that docks of sufficient capacity be constructed at New York, Philadelphia, and Norfolk without delay.

The new Navy demands of this Bureau additional wharf room, more dry docks, better facilities for taking coal on board, and appliances for handling heavy armor and guns.

During the past year much has been done in rebuilding substantial wharves at New York, League Island, Mare Island, Norfolk, and New London.

Estimates will be submitted for coal pockets and facilities for handling coal. Contracts have been entered into for immense traveling cranes at New York and Norfolk. Appropriations will be asked for cranes at League Island and Mare Island.

A Simpson dry dock was opened at League Island in March. Work was begun in April on the dry dock at Port Royal. Congress has appropriated money to build a dry dock at Puget Sound, plans for which are being prepared, and proposals will be advertised for as soon as possession is obtained of the site and the exact location of the dock decided upon.

ELECTRIC LIGHTING.

During the past year the navy-yard at Mare Island has been lighted by electricity, at a cost of installation of about $45,000. The plant has been put in by the Thomson-Houston Company, and is said to be the best in the country. It gives great satisfaction and reflects credit upon the builders. It removes a source of great danger from fire, besides adding largely to the working facilities. The appropriations for the navy-yards at New York and Norfolk were inadequate to install an electric-lighting plant; twice were bids received and as many times rejected as being in excess of the appropriation.

The Bureau is now putting in an electric-lighting plant in the New York yard, having purchased the material for it, utilizing engines and boilers in the yard, thus keeping within the appropriation.

Another effort will be made to light the Norfolk yard within the limits of the appropriation; if unsuccessful, an additional appropriation will be asked for. League Island should be lighted by electricity, as it has no connection with the city gas works; $32,000 will be required for this purpose. Provision should be made to light the other yards, at the rate of one each year.

NAVAL PRISONS.

There are two naval prisons, one at Mare Island, Cal., the other in Boston navy-yard.

Extensive repairs and alterations have been made on each. That in Boston occupies part of a building originally built for a storehouse, and is in my opinion unsuitable for the purpose. A regular prison should be built on Seavey Island, a part of the Portsmouth, N. H., navy-yard. There is room not only for the building, but for a proper yard for exercise as well as for workshops. There is also an inexhaustible supply of granite, to utilize which would give employment to the prisoners. It is estimated that a suitable structure can be built for $75,000.

The capacity of the prison at Mare Island has been doubled, as well

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as other essential improvements made. The prisoners sent to the naval prisons are those convicted of offenses against discipline, not for criminal offenses.

They should not be maintained in idleness, but should be forced to learn a trade or do other work, so that when released they may become useful citizens.

CIVIL ENGINEERS.

The number of civil engineers constituting the corps of that name is insufficient to perform the duties of designing, constructing, and maintaining the many important engineering and architectural works under the charge of this Bureau.

The number at present in the corps is 10. The law provides for one at the Bureau and one at each navy-yard as necessary. The present number is one which precedent has established.

I am of the opinion that not only the civil engineering and architectural works within the limits of the navy-yards and naval stations, but all of that character undertaken under the Navy Department should be carried out under the immediate supervision of members of the Corps of Civil Engineers, who by their training and experience, are qualified for the duty.

The work in progress at some of the yards and stations is so great in extent and of such a character that it demands intelligent professional assistance to the civil engineers in charge in order to its proper execution.

To meet the needs of the service in these respects I would recommend that the corps be increased to twenty, as follows: Twelve civil engineers and eight assistant civil engineers. Two civil engineers to be appointed at once from civil life, from graduate civil engineers, who pass a satisfactory professional and physical examination, and two assistants to be selected from graduates of the Naval Academy each year until the prescribed number is obtained, who shall be commissioned as assistant civil engineers after having pursued a course in civil engineering at the Naval Academy or at some other institution.

Thereafter all vacancies in the grade of assistants to be filled by selection from graduates of the Academy under similar conditions, as they may occur. And all vacancies in the grade of civil engineers to be filled by promotion from the grade of assistants after a professional and physical examination.

The law of 1864 made provision for the education of civil engineers at the Naval Academy, but no steps under it were taken, and in a revision of the statutes subsequent to that time it was omitted.

An increase to the above number would enable the Bureau to assign one to each yard, station and dock site where needed; supply the needs for assistants, and provide details to the supervision of works in their professional line upon application from other bureaus.

FOREMAN LABORERS.

This title has been retained since the days when the Bureau of Yards and Docks furnished all the labor required in the navy-yards by the several bureaus; now each bureau provides its own labor. I therefore recommend that the title be changed to foreman; that he be required to have a general knowledge of the trades, and to secure this a rate of $5 per day be established. Such a man would be of great use and relieve the civil engineer of minor details.

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NAVAL HOME.

There were borne upon the rolls of the Naval Home, July 1, 1891, 231 beneficiaries, sailors, and marines, who have served their country faithfully.

This institution has been ably governed during the past year by Capts. Potter, Erben, and Commander Miller, and is now under the command of Commodore Stanton. A slight increase is asked for, which I concur in, as it will add to its efficiency. The money required to support this institution is paid out of the pension fund, which many of its inmates assisted to create, besides which the beneficiaries have to relinquish their pension upon entering the Home, the amount so relinquished being nearly equal to that appropriated for its support. The addition of an elevator and proper bathrooms during the past year have added much to the health and comfort to the inmates. I renew my recommendations of last year, and that of my predecessors for several years past, that the portion of the land, about 4 acres, bordering on the Schuykill, which is beyond the walls of the Home, and of no use to it, be sold and the proceeds used to erect a recreation hall for a bowling alley and other means of amusement. This land was purchased from the pension fund, and rightly belongs to the pensioners, and therefore the proceeds of the sale should revert to them.

Legislation is necessary to dispose of the estates of inmates dying intestate. By the laws of Pennsylvania, in which State the home is situated, such estates would revert to the State of Pennsylvania; but as this State has ceded jurisdiction to the United States of the land occupied by the Home, it would seem but just that the estates of those dying intestate should revert to the benefit of the Naval Home. Legislation to this effect is recommended.

NAVY-YARD, PORTSMOUTH, N. H.

A building to replace Nos. 45 and 46 destroyed by fire is nearly completed. In order to lesson the liability to loss by fire it has been deemed advisable to place the boilers for running the machinery outside in a separate building. A small appropriation is asked to put this up.

The reservoir and water system it is expected will be completed this year. It is a valuable and necessary improvement which should have been made long since.

The balance dry dock at this station requires extensive repairs. It is of wood and has been in constant use for forty years, but as its capacity is not beyond 3,500 tons it is useless for the larger vessels, and therefore I do not recommend that a large sum be expended upon its repairs. If this yard is to be maintained a new dry dock is required. It is believed that by taking advantage of the channel, the bottom and sides of which are between the two islands which compose this yard, closing one end and putting a gate at the other, with the necessary pumping machinery, a stone dock capable of docking the largest ships will be obtained at a comparatively small outlay. As this yard with its fine climate is a sanitarium for ships to go to after a cruise in the tropics to refit, it is recommended that steps be taken to construct this dock by appropriating $100,000 to commence.

NAVY-YARD, BOSTON, MASS.

There is a fine stone dry dock to which is now being added modern pumping machinery. It possesses a fine plant, but is very deficient in wharf room. Several of the wharves are decayed beyond repair and will have to be rebuilt.

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Instead of rebuilding these it is proposed to dredge out a basin in which ships may lie in close proximity to the shops. This basin is partially dug now, and it is believed that an annual appropriation of $100,000 for three years will complete it, and as the dry dock at Portsmouth has not the capacity for modern ships the Boston yard is the only one on the New England coast capable of docking them, and should therefore be in a suitable condition. A pair of shears for lifting great weights will be erected there during the coming year.

NAVAL STATION, NEW LONDON, CONN.

This station should be fully equipped as a coaling station and a base of supplies generally. Being so near the entrance to Long Island Sound, its strategic value is immense. Coal pockets could be built and the station can be supplied with fresh water at a small expense. This should be done.

A small appropriation is asked to repair two old frame houses now used for quarters, that the officers who reside in them may be reasonably comfortable.

NAVY-YARD, BROOKLYN, N. Y.

More vessels are fitted out at this navy-yard and more work done than at any other. It is very deficient in wharf room. The improvements now going on at the Cob dock will in a few years afford ample space, and an appropriation is asked for to continue this work. The Engineer-in-Chief has requested that an appropriation be asked to complete the boiler and erecting shops. I deem this very necessary. Engines and boilers are being constructed here for several ships now building. The Bureau has been obliged to put up a temporary wooden shelter to protect the boilermakers during inclement weather. The making of an entrance at the foot of Sands street is very desirable. It will be near the line of cars; it will permit the sailors to reach town without passing the numerous grog shops which now line Bridge street, forming a temptation which many can not resist; it will be more convenient for the workmen, and will give a straight entrance at an easier grade, thus saving the teams. The coal yard has been improved by the building of a new shed, and fitting a modern coal discharge.

NAVY-YARD, LEAGUE ISLAND, PA.

With the exception of the Washington navy-yard this is the only one situated on fresh water. On this account, its being easily defended, its central location, and its interior water communication with New York and the Chesapeake, destine it to be the most important naval station on the whole eastern coast. Valuable work is going on here.

The time is not far distant when, for the sake of economy, it will be necessary to lay up many of our ships during part of the year.

A magnificent Simpson dry dock was opened for use in March. Piers and sea walls are under construction so that by June next the yard will be in working condition for repairs of all kinds. It is to be hoped that Congress will continue to appropriate liberally, so that by the time the vessels now under construction are finished they can be laid up when not in commission here in fresh water, thus saving an immense deterioration. Plans for completing this yard have been made after much consideration by a board of officers, and it is proposed

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to adopt and follow them. The depository of material on League Island from Smith and Windmill islands now being removed, will soon give a large extent of valuable land. In this connection it is recommended to fill up one-half of the back channel.

The act of Congress relating to this has been construed by the War Department as applying only to League Island proper, and not to League Island station, which embraces both the island and channel.

Two sets of officers' quarters will soon be completed at this station, and an estimate is submitted to construct four more. It is essential that officers on duty here should reside, as at other stations, at the scene of their duties. It is impossible to properly perform work where those who have it in charge reside miles away from it.

NAVY-YARD, WASHINGTON, D. C.

This is principally used for the manufacture of ordnance. That work, to be economically and rapidly done, requires that the breech-mechanism shop be remodeled, for which an estimate is made.

It is very necessary that there should be sufficient and proper storage and shipping facilities, for which an estimate is submitted.

The channel to the yard will be dredged as soon as the improvement to the Eastern Branch, under the direction of the War Department, is completed.

NAVY-YARD, NORFOLK, VA.

If this yard is to be maintained it is very necessary to acquire the property on the opposite shore adjoining the ordnance yard at St. Helena. This has been frequently recommended. In report No. 140, Forty-seventh Congress, first session, House report, the subject is ably discussed, in which I fully concur, and invite your attention thereto.

The old gate at the stone dry dock is from long use about worn out and should be replaced.

The extension to the quay wall and coal shed are imperatively necessary. The warrant officers have no quarters furnished there, and it is only right that these worthy men should have residences near the scene of their duties.

It is believed that the *Texas* and *Raleigh* will be launched during the year, for which preparations are being made.

The Portsmouth Water Company have so largely increased their rates that the Bureau will try to obtain water by other means, at a great saving.

NAVAL STATION, PORT ROYAL, S. C.

In accordance with act of Congress June 30, 1890, a dry dock is being constructed at this station by Mr. Justin McCarthy, who was the lowest bidder for the work. It is to be completed two years from the date of contract, and will be larger than any the Government now has. The small sum asked for at this station is necessary for its efficiency.

NAVAL STATION, KEY WEST, FLA.

This station should be provided with means of receiving and delivering coal with less cost than at present, and with greater rapidity. The Bureau is considering how to do this, and may later submit an estimate for this improvement.

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NAVY-YARD, PENSACOLA, FLA.

Pending action as to whether this yard is to be abandoned, the Bureau does not submit any estimates.

There is an uncompleted iron sectional dry dock at this station; if complete its lifting capacity would be less than 2,000 tons, and therefore of no use for our larger vessels. To complete the dock it will cost between $70,000 and $80,000, for which an appropriation of $71,073 was asked for in 1882. The machinery and fittings are boxed and stored about the yard. To overhaul these will cost, per estimate, $3,581.48. The Bureau recommends that the dock be condemned and sold according to law, being unfitted for general use.

NAVY-YARD, MARE ISLAND, CAL.

This being the only yard in working condition on the Pacific coast requires to be in first-class working order. I again earnestly recommend that an appropriation be made for an artesian well. At present the main supply of water comes from the Vallejo Water Company, which in dry seasons might not be able to stand the tax upon it. It is of vital importance at all times to have an abundant supply of fresh water. The cost of ferriage, the inconvenience to employés and others, render it in my judgment necessary to have a bridge to the mainland.

The sectional dry dock, if repaired, will lift vessels of about 2,500 tons, which is sufficient for the smaller cruising vessels. It has been in use since 1852, and if it is deemed inadvisable to repair this dock, steps should be taken to construct a new dock, for there is but one other at the yard, and in consequence there is much delay in fitting out ships.

NAVAL STATION, PUGET SOUND, WASH.

Plans are being prepared for a dry dock at this locality, and as soon as completed and the land acquired, will be advertised.

Lieut. A. B. Wyckoff was ordered in April to proceed to Seattle, Wash., to acquire a site for this station.

He has performed this duty most satisfactorily to the Bureau, securing about 140 acres at Port Orchard; a tract of about 40 acres more is in the course of condemnation before the courts to get a clear title.

INCREASE OF THE NAVY.

Two traveling cranes are required, one at Mare Island, the other at League Island, to handle armor and other heavy weights.

I renew my former request, that the pay of the chief clerk of this Bureau may be increased to $2,250. It is a great injustice that such valuable services are so inadequately paid.

The increase of the number of navy-yards and stations, as well as the improvements incidental to the new navy, added greatly to the work of the small clerical force of this Bureau. I trust you will approve of the request for an additional clerk.

The entire amount asked for by the Bureau is $3,529,976.17, the detail of which is contained in the tabulated sheets Nos. 1 to 6, recapitulated as follows:

Sheet No. 1. Bureau	$12,430.00
Sheet No. 2. Maintenance and contingent	540,000.00
Sheet No. 3. Naval Home	77,295.00
Sheet No. 4. Repairs and preservation	500,000.00
Sheet No. 5. Improvements and increase of the navy	2,329,776.43
Sheet No. 6. Civil establishment	70,474.74
Total	3,529,976.17

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A statement showing the amount expended under each specific head of appropriation during the fiscal year ending June 30, 1891, and the balance remaining unexpended June 30, as required by section 429, R. S., is appended.

Accompanying this report is an abstract of offers for special objects of improvement and supplies coming under the cognizance of the Bureau of Yards and Docks, made in conformity to act of Congress, approved March 3, 1843.

Also, a report showing the amount expended during the fiscal year ending June 30, 1891, from appropriations pertaining to this Bureau for civilians employed on clerical duty or in any other capacity than as ordinary mechanics and workingmen at the several navy-yards, with estimates for the same for the fiscal year ending June 30, 1893, in compliance with the third section of naval appropriation act, approved January 30, 1885.

Very respectfully, your obedient servant,

N. H. FARQUHAR,
Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

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No. 1.—*Report of expenditures at navy-yards, stations, and Naval Asylum for the year ending June 30, 1891.*

Yards and stations.	Appropriations.					
	Yard improvements.	Repairs and preservation.	General maintenance.	Civil establishment.	Contingent.	Total.
Portsmouth, N. H	$37,836.30	$23 933.70	$25,938.91	$5,885.00	$702.26	$94,296.17
Boston, Mass	4,339.22	31,540.84	27,803.72	5,339.70	.....	69,023.48
New London, Conn	6,500.00	5,207.83	6,278.57	.....	.....	17,986.40
New York, N. Y	141,300.35	80,712.85	44,738.87	13,530.25	3,883.66	284,165.98
League Island, Pa	300,696.94	17,705.07	13,129.25	4,094.43	.....	335,625.69
Washington, D. C	5,296.83	21,910.15	14,261 97	3,270.00	1,880.44	46,619.39
Norfolk, Va	20,552.80	27,701.15	30,838.29	7,293.84	.....	86,386.08
Pensacola, Fla	.....	10,572.84	12,424.92	1,930.00	.....	24,927.40
Mare Island, Cal	79,483.38	47,709.76	38,762.09	10,402.90	11,735.28	188,093.41
Sackets Harbor, N. Y	.....	.....	28.50	365.00	.....	393.50
Key West, Fla	371.25	7,195.21	3,932.69	600.00	.....	12,099.15
Naval Home, Pa	69,189.89	.....	.....	.....	.....	69,189.89
Wharf at Erie, Pa	.....	.....	.....	.....	500.00	500.00
Port Royal, S. C	7,728.52	1,609.50	1,901.44	.....	.....	11,239.46
Total	675,295.48	275,798.54	220,039.22	52,712.12	18,701.64	1,240,546.00

No. 2.—*Detailed report from navy-yards and stations of expenditures under "Repairs and preservation" during the fiscal year ending June 30, 1891.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.
Yard buildings	$6,734.53	$16,407.25	$1,381.85	$29,535.20	$9,972.52	$3,897.10
Officers' quarters	4,556.86	2,702.25	2,266.75	3,271.70	1,872.03	4,067.34
Wharves, bridges, landings, and boats	2,164.32	55.92	230.37	3,724.51	362.05	2,500.47
Roads, walks, gutters, and drains	1,671.54	3,062.28	496.82	4,081.78	1,834.13	4,002.25
Fences and walls	204.92	156.41	832.04	998.70	208.62	82.64
Cranes, scows, and derricks	1,010.40	182.40	.....	3,632.38	94.91	1,016.53
Furnaces, forges, heating apparatus, etc	2,338.85	1,449.99	.....	1,830.40	366.21	1,900.08
Tracks and scales	38.64	793.35	.....	137.16	.....	2,934.47
Water and gas works	853.71	1,638.64	.....	1,878.95	29.46	868.61
Dredging and scowing	.....	.....	.....	22,887.72	.....	7.50
Dry docks	1,797.43	1,668.10	.....	406.87	.....	.....
Miscellaneous repairs	2,562.50	1,540.09	.....	8,327.48	2,965.14	633.16
Repairs to dikes	.....	.....	.....	.....	.....	.....
Coal	.....	1,884.16	.....	.....	.....	.....
Total	23,933.70	31,540.84	5,207.83	80,712.85	17,705.07	21,910.15

Objects.	Norfolk.	Pensacola.	Mare Island.	Key West.	Port Royal.	Total.
Yard buildings	$8,587.06	$1,344.14	$14,509.88	.....	$150.00	$92,519.53
Officers' quarters	4,607.73	3,887.34	5,382.34	.....	625.00	33,239.34
Wharves, bridges, landings, and boats	418.46	1.032.22	1,872.38	$5,751.00	50.00	18,161.70
Roads, walks, gutters, and drains	3,058.94	609.45	4,712.62	50.00	150.00	23,729.81
Fences and walls	573.08	223.95	353.28	59.45	300.00	3,993.09
Cranes, scows, and derricks	288.52	27.26	1,017.80	.....	25.00	7,295.20
Furnaces, forges, heating apparatus, etc	1,219.43	201.40	3,462.88	.....	.....	12,769.24
Tracks and scales	33.48	231.76	145.34	.....	.....	4,314.20
Water and gas works	685.79	285.23	5,838.04	108.44	100.00	12,286.87
Dredging and scowing	.....	.....	598.87	.....	52.00	23,546.09
Dry docks	657.42	151.48	417.30	146.32	.....	5,244.92
Miscellaneous repairs	7,571.24	2,578.25	9,399.03	1,080.00	157.50	36,814.39
Repairs to dikes	.....	.....	.....	.....	.....	.....
Coal	.....	.....	.....	.....	.....	1,884.16
Total	27,701.15	10,572.48	47,709.76	7,195.21	1,609.50	275,798.54

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No. 3—*Detailed report of expenditures under "General maintenance" received from yards and stations during the fiscal year ending June 30, 1891.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.	Pensacola.	Mare Island.	Key West.	Sackets Harbor.	Port Royal.	Total.
Freight and transportation				$73.68		$9.00		$12.47	$1,446.13	$264.55			$1,805.83
Stationery and advertising	$392.87	$240.52	$56.10	1,511.46	$130.29	207.61	$367.77	238.57	454.21	10.25			3,609.65
Books, maps, models, and drawings		357.00	4.00	12.00	60.49	217.37	70.94	10.00	10.50				742.30
Purchase and repair of fire engines	310.00	559.00	8.75	35.62			593.89	32.18	578.68				2,118.12
Machinery of every description, and patent rights		394.69		65.56	19.36	188.25	361.83	101.03	42.64	83.75			1,207.11
Repairs on steam engines, and attendance on same					18.63		452.24	81.78	541.53				1,094.18
Purchase and maintenance of oxen and horses, and driving, etc	3,536.21	3,883.48	1,128.40	3,883.40	4,268.42	3,121.38	4,516.59	2,098.78	9,252.42			$129.00	35,818.18
Carts, timber-wheels, vehicles, and repairing of same	1,217.95	1,624.27	1.16	3,670.54	786.98	898.02	546.90	905.46	768.10	131.60			10,550.98
Postage on letters on public service, and telegrams, telephones, and fire-alarm service		4.00		197.13		12.60			750.78	6.00			969.91
Furniture for Government houses and offices in navy-yards	4,737.22	4,406.48	498.02	3,397.73	118.68	1,982.08	5,792.06	586.49	154.77	1,932.20		612.00	24,215.73
Coal and other fuel	2,541.50	3,772.84	208.64	5,159.50	425.80	918.39	1,035.29	213.25	3,585.56		$28.50	132.50	18,021.27
Candles, oil, and gas	1,498.01	1,047.25	3.91	1,847.41		924.25	1,266.36	337.13	2,938.10	12.50		82.50	9,957.42
Cleaning and clearing up yards and care of buildings	2,567.10	2,249.31	1,393.00	2,444.55	234.05	3,404.27	3,808.85	707.60	2,163.22			565.00	19,536.95
Attendance on fires, lights, fire engines, and apparatus	3,063.57	1,685.93	10.65	4,335.29	2,674.04	915.80	835.54	1,540.48	3,163.24				18,224.54
Incidental labor not chargeable to other appropriations	2,167.04	80.51	765.94	2,053.89	42.94	1,186.26	12.24		2,481.53			193.44	8,983.79
Water tax		3,312.64		8,726.61			1,707.83	117.60	5,357.19	88.00		144.00	19,453.87
Tolls and ferriage			12.00	100.00				60.00	2,839.81				3,011.81
Pay of watchmen	3,890.96	3,990.88	2,190.00	7,116.50	1,460.00		9,335.00	5,314.40	2,218.58	1,395.00			36,911.32
Awnings and packing boxes	16.48	194.42		108.00	130.11	327.29	134.96	67.70	15.10	8.84		43.00	1,046.40
Rent of officers' quarters, Philadelphia, Pa.					2,759.96								2,759.96
Total	25,968.91	27,803.72	6,278.57	44,788.87	13,129.25	14,261.97	30,838.29	12,424.92	38,762.09	3,932.69	28.50	1,901.44	220,039.32

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No. 4.—*Estimates received from navy-yards, stations, and Naval Asylum for fiscal year ending June 30, 1893.*

Yards and stations.	Appropriations.				
	Yard improvements.	Repairs and preservation.	General maintenance.	Civil establishment.	Total.
Portsmouth, N. H.	$429,500.00	$69,500.00	$43,200.00	$10,093.50	$552,293.50
Boston, Mass.	549,000.00	77,500.00	38,750.00	10,789.25	676,039.25
New London, Conn			5,722.00		5,722.00
New York, N. Y.	2,015,118.94	314,160.91	112,999.10	22,025.00	2,464,903.95
League Island, Pa	800,852.63	49,360.90	37,144.40	4,278.00	891,635.93
Washington, D. C.	54,966.89	27,200.00	23,875.12	5,226.00	111,268.01
Norfolk, Va.	328,250.00	90,700.00	94,703.30	13,861.88	527,515.18
Pensacola, Fla.		75,979.81	18,098.85	2,480.00	96,558.66
Mare Island, Cal.	472,637.28	100,345.64	69,336.42	20,449.46	662,768.80
Sackets Harbor, N. Y.		700.00			700.00
Key West, Fla.	675,000.00	3,964.05	2,718.50	600.00	682,277.55
Naval Home, Pa.	77,295.00				77,295.00
Port Royal, S. C.	24,750.00	8,300.00	14,850.00	1,800.00	49,700.00
Total.	5,427,370.74	817,711.31	461,392.69	92,203.09	6,798,677.83

No. 5.—*Detailed estimates from yards and stations for works of improvement for the fiscal year ending June 30, 1893.*

Yards, stations, and objects.	Estimates.	Total.
PORTSMOUTH, N. H.		
For timber, dry dock (for first year)	$200,000.00	
For completing buildings 45, 46	60,000.00	
For boiler shop	45,000.00	
For alteration to building No. 27	9,500.00	
For repairs to ship houses Nos. 53, 54, and 55	15,000.00	
For naval prison	75,000.00	
For coal pockets, building for storage of coal	25,000.00	
		$429,500.00
BOSTON, MASS.		
For wet basin	150,000.00	
For completing steel shears	32,000.00	
For repairs to large machine shop No. 42	50,000.00	
For repairs to shops and buildings	45,000.00	
For repairing and rebuilding dry docks	125,000.00	
For repairs and preservation of ship houses	25,000.00	
For rebuilding wharfs	75,000.00	
For electric lighting	12,000.00	
For coal pocket	35,000.00	
		549,000.00
NEW YORK, N. Y.		
For extension to boiler-shop building No. 28, Steam Engineering	60,873.20	
For erecting shop, Steam Engineering	108,110.24	
For blacksmith and copper shop	103,771.63	
For Yards and Docks workshop	146,929.67	
For paint and oil storehouse	146,809.70	
For construction of carpenter and joiner shop	127,665.42	
For machine, building, and furnace shop	97,690.36	
For gateway on Sands street with building No. 53 (entrance)	14,154.08	
For taking down end wall and altering building No. 15, (entrance)	3,225.00	
For paving and grading streets in connection with gateway on Sands street	18,144.00	
For extension of Provisions and Clothing storehouse	46,428.44	
For extension and alteration of building No. 8	34,208.00	
For sand-storage shed	2,341.70	
For new timber and concrete dry dock	616,700.00	
For quay wall from NW. boundary to ship house "D"	67,150.75	
For quay wall on cob dock from entrance to Whitney Basin to bridge	75,561.00	
For quay wall, Whitney Basin from "B to C"	67,150.75	
For paving, curbing, and flagging Warrington ave., 4th and 5th streets	97,020.00	
For extension of railroad track	20,105.00	
For boundary wall from Wallabout Channel along Washington avenue to Marine Barracks	111,080.00	
For dredging in Whitney Basin	50,000.00	
		2,015,118.94
LEAGUE ISLAND YARD, PA.		
For extension of quay wall	196,812.00	
For building slips	105,000.00	
For plate and bending shed	75,000.00	

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No. 5 -*Detailed estimates from yards and stations, etc.*—Continued.

Yards, stations, and objects.	Estimates.	Total.
LEAGUE ISLAND YARD, PA.—continued.		
For new pier	$135,000.00	
For four officers' quarters	60,000.00	
For crane for Broad street wharf	25,000.00	
For extension of light retaining wall	30,365.00	
For crane scow	10,000.00	
For pile-driver	5,500.00	
For two deck scows	4,000.00	
For mud scow	5,600.00	
For paving	23,331.00	
For concrete sidewalks	9,100.00	
For riprap, Broad street wharf	6,500.00	
For branch sewer	2,100.00	
For commandant's office	53,735.39	
For railroad	18,409.24	
For traveling crane	30,000.06	
		$800,852.63
NAVAL HOME, PHILADELPHIA, PA.		
For support of beneficiaries and repairs, improvements, and all expenses		77,295.00
WASHINGTON, D. C.		
For reconstructing store No. 10	29,190.27	
For reconstructing breech mechanism shop	24,938.62	
For taking down walls and roof and filling in old ice house	838.00	
		54,966.89
NORFOLK, VA.		
For floating gate for granite dry dock	36,000.00	
For repairs to granite dry dock	80,000.00	
For improvement of timber basin	140,250.00	
For extension to quay wall	50,000.00	
For coal shed	10,000.00	
For warrant officers' quarters at St. Helena	12,000.00	
		328,250.00
PORT ROYAL, S. C.		
For three officers' quarters	7,500.00	
For telegraph and telephone lines	1,500.00	
For hospital	2,000.00	
For boathouse	1,500.00	
For water-closet	250.00	
For general storehouse	2,000.00	
For extra property	10,000.00	
		24,750.00
KEY WEST, FLA.		
For purchase of Mallory lot	20,000.00	
For iron coaling wharf	30,000.00	
For brick coal shed	25,000.00	
For floating dry dock	600,000.00	
		675,000.00
MARE ISLAND, CAL.		
For new caisson for stone dry dock	53,000.00	
For dredging	13,800.00	
For two 12-ton pillow wharf cranes	7,682.56	
For repairs to sectional dock	65,512.38	
For artesian well	30,000.00	
For extension of quay wall	132,000.00	
For road to cemetery and magazine	17,500.00	
For yard roads	13,827.14	
For fences	13,965.00	
For locomotive for yard use	4,000.00	
For replanking wharfs	3,168.14	
For Smead dry-air closets near building No. 41	4,456.13	
For new carriage house and dirt stalls for yard stables	3,954.27	
For renewing board sidewalks	5,684.22	
For repairs to Steam Engineering buildings	4,797.75	
For stone dry dock	49,508.80	
For extending timber shed building No. 94	38,226.84	
For oil house for general storekeeper	11,554.05	
		472,637.28
Total estimates received from yards, stations, and Naval Home		5,427,370.74

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No. 6.—*Detailed estimates from navy-yards and stations for "repairs and preservation" for the fiscal year ending June 30, 1893.*

Objects.	Portsmouth.	Boston.	New York.	League Island.	Washington.	Norfolk.
Yard buildings	$25,000.00	$40,000.00	$186,785.91	$17,227.90	$5,000.00	$47,000.00
Officers' quarters	2,500.00	2,500.00	7,052.00	.....	2,000.00	12,000.00
Wharfs, bridges, landings, and boats, moorings, etc	5,000.00	5,000.00	15,630.00	.....	250.00	3,700.00
Roads, walks, gutters, and drains	2,500.00	7,500.00	42,800.00	.....	6,000.00	10,000.00
Fences and walls	1,000.00	1,000.00	6,535.50	335.00	1,000.00	1,500.00
Cranes, scows, and derricks	3,000.00	1,000.00	10,000.00	910.00	250.00	5,000.00
Furnaces, forges, heating apparatus, etc	4,000.00	2,000.00	9,628.00	558.00	4,500.00	1,200.00
Tracks and scales	500.00	5,000.00	894.00	300.00	5,500.00	1,500.00
Water, gas, and electric-light works	1,000.00	1,500.00	10,600.00	.....	2,500.00	1,800.00
Dredging and scowing	.....	5,000.00	16,000.00	.....	.....	2,000.00
Dry docks	20,000.00	2,000.00	785.50	.....	.....	.....
Miscellaneous repairs	5,000.00	5,000.00	7,500.00	30.00	200.00	5,000.00
Dikes	.....	.....	.....	30,000.00	.....	.....
Total	69,500.00	77,500.00	314,160.91	49,360.90	27,200.00	90,700.00

Objects.	Pensacola.	Mare Island.	Sackette Harbor.	Key West.	Port Royal.	Total.
Yard buildings	$8,698.19	$43,975.16	$700.00	$897.50	$500.00	$375,639.66
Officers' quarters	6,698.91	7,563.30	.....	.....	1,000.00	41,309.21
Wharfs, bridges, landings, and boats, moorings, etc	24,822.42	2,686.30	.....	317.00	1,000.00	58,405.72
Roads, walks, gutters, and drains	1,346.74	21,820.37	.....	.....	800.00	92,767.11
Fences and walls	2,532.60	3,804.89	.....	852.75	500.00	19,060.74
Cranes, scows, and derricks	2,166.00	3,000.00	.....	.....	1,500.00	26,826.00
Furnaces, forges, heating apparatus, etc	414.27	2,371.09	.....	.....	500.00	25,171.36
Tracks and scales	.....	531,76	.....	.....	1,000.00	15,225.76
Water, gas, and electric-light works	1,105.00	4,182.58	.....	.....	1,000.00	23,687.58
Dredging and scowing	15,720.00	500.00	.....	.....	.....	39,220.00
Dry docks	10,583.00	1,910.19	.....	.....	.....	35,278.69
Miscellaneous repairs	1,992.68	8,000.00	.....	1,896.80	500.00	35,119.48
Dikes	.....	.....	.....	.....	.....	30,000.00
Total	75,979.81	100,345.64	700.00	3,964.05	8,300,00	817,711.31

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No. 7.—*Detailed estimate for "general maintenance" received from yards and stations for the fiscal year ending June 30, 1893.*

Objects.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.	Pensacola.	Mare Island.	Key West.	Port Royal.	Total.
Freight and transportation	$1,000.00	$250.00	.....	$1,000.00	.....	$50.00	$100.00	$25.00	$2,000.00	$200.00	$100.00	$4,725.00
Printing, stationery, and advertising	1,000.00	400.00	.....	1,800.00	$150.00	500.00	500.00	232.00	500.00	20.00	150.00	5,250.00
Books, maps, models, and drawings	500.00	500.00	.....	1,750.00	200.00	50.00	1,000.00	20.00	100.00	.....	.....	4,120.00
Purchase and repair of fire engines	1,000.00	500.00	.....	7,000.00	.....	200.00	850.00	1,456.50	1,000.00	.....	1,000.00	13,006.50
Machinery of every description and patent rights	2,500.00	3,000.00	.....	8,200.00	1,867.00	250.00	17,500.00	195.00	500.00	.....	300.00	34,112.00
Repairs on steam engines and attendance on same	1,500.00	500.00	.....	8,000.00	1,230.20	500.00	6,680.00	581.00	2,416.80	.....	3,000.00	24,408.00
Purchase and maintenance of oxen and horses, and driving teams	7,500.00	7,500.00	$1,150.00	20,382.50	5,545.00	5,000.00	14,415.00	1,515.38	9,805.70	.....	1,000.00	73,513.58
Carts, timber wheels, and tools of every description	5,000.00	2,500.00	.....	8,256.00	2,500.00	2,500.00	9,500.00	608.00	800.00	8.00	500.00	32,172.00
Postage on letters on public service and telegrams	50.00	50.00	.....	600.00	100.00	20.00	25.00	.....	300.00	12.00	100.00	1,257.00
Furniture for Government houses and offices in navy-yards	5,000.00	2,000.00	.....	5,600.00	1,396.00	1,500.00	7,000.00	836.00	3,000.00	.....	2,000.00	28,332.00
Coal and other fuel for Yards and Docks purposes	3,000.00	3,000.00	290.00	9,170.00	1,660.00	2,000.00	2,760.00	243.50	14,400.00	.....	1,000.00	37,523.50
Candles, oil, and gas	2,000.00	2,500.00	225.00	864.00	195.00	1,000.00	2,650.00	378.00	4,297.60	122.50	600.00	14,832.10
Cleaning and clearing up yards and care of buildings	3,000.00	4,500.00	1,006.00	11,232.00	4,200.00	5,500.00	5,760.00	1,659.48	10,829.72	200.00	1,500.00	49,381.20
Attendance on fires, lights, fire engines, and apparatus	3,500.00	2,000.00	832.00	6,707.60	4,200.00	3,205.12	3,676.00	2,425.76	6,132.00	.....	600.00	33,278.48
Incidental labor, not chargeable to other appropriations	2,500.00	2,500.00	.....	5,304.00	5,900.00	1,500.00	6,000.00	.....	1,000.00	.....	500.00	25,204.00
Water tax	.....	3,000.00	.....	7,000.00	.....	.....	4,500.00	156.80	6,900.00	146.00	.....	21,702.80
Tolls and ferriage	50.00	.....	25.00	200.00	.....	.....	50.00	60.00	2,900.00	.....	.....	3,285.00
Pay of watchmen in navy-yards	4,000.00	4,000.00	2,200.00	9,855.00	7,300.00	.....	11,504.80	7,504.40	2,204.60	1,995.00	2,400.00	52,963.80
Awnings and packing boxes	100.00	50.00	.....	378.00	701.20	100.00	232.50	202.03	250.00	10.00	100.00	2,128.73
Rent of landings	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	43,200.00	38,750.00	5,722.00	112,999.10	37,144.40	23,875.12	94,703.30	18,098.85	69,336.42	2,713.50	14,850.00	461,392.69

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No. 8.—*Report showing amount expended during the fiscal year ending June 30, 1891, from appropriations pertaining to the Bureau of Yards and Docks, for civilians employed on clerical duty or in any other capacity than ordinary mechanics and workingmen, at the several navy-yards, and submitting estimates for such civilian employés for the fiscal year 1893, in compliance with the third section of naval appropriation act approved January 30, 1885 (for a year of 365 days).*

Navy-yards and rating, and rate of pay.	Amount paid to civilians employed during the fiscal year ending June 30, 1891.	Estimates for civilian employés for the fiscal year ending June 30, 1893.	
		Rate of pay.	Amount.
PORTSMOUTH, N. H.			
Clerk, at $1,400 per annum	$1,400.00	$1,400.00	$1,400.00
Mail messenger, at $2 per diem*	730.00	2.00	730.00
Messenger, at $600 per annum	600.00	600.00	600.00
Foreman (general), at $5 per diem (submitted)	1,460.00	5.00	1,565.00
Pilot, at $3 per diem	1,095.00	3.00	1,095.00
Janitor, at $600 per annnum	600.00	600.00	600.00
Foreman mason, when required, at $5 per diem (submitted)	1,456.50	5.00	1,565.00
Draftsman, at $4 per diem	940.00	.....	.....
Total	8,281.50	.....	7,555.00
BOSTON, MASS.			
Clerk, at $1,400 per annum	1,400.00	1,400.00	1,400.00
Foreman (general), at $5 per diem (submitted)	1,240.00	5.00	1,565.00
Messenger to commandant, at $1.76 per diem	550.88	1.76	550.88
Messenger, at $1.76 per diem	550.88	1.76	550.88
Mail messenger, at $2 per diem*	730.00	2.00	730.00
Writer, at $900 per annum	867.94	900.00	900.00
Draftsman, at $4.56 per diem	1,322.40	.....	.....
Total	5,662.10	.....	5,696.76
BROOKLYN, N. Y.			
Clerk, at $1,400 per annum	1,399.99	1,400.00	1,400.00
Writer, at $1,017.25 per annum	958.72	1,017.25	1,017.25
Two masters of tugs, at $1,500 each per annum	1,376.72	1,500.00	3,000.00
Assistant to civil engineer, at $6 per diem (submitted)	.....	6.00	1,878.00
Two writers, at $900 each per annum	1,723.57	900.00	1,800.00
Foreman (general), at $5 per day (submitted)	1,408.50	5.00	1,565.00
Mail messenger, at $2 per diem*	730.00	2.00	730.00
Two messengers, at $2.25 each per diem	1,408.50	2.25	1,408.50
Draftsman, at $5 per diem	1,545.00	5.00	1,565.00
Quarterman, at $3 per diem	906.00	3.00	939.00
Superintendent of teams or quarterman, at $4 per diem	1,252.00	4.00	1,252.00
Messenger to commandant, at $2.25 per diem*	821.25	2.25	821.25
Electrician, at $1,200 per annum (submitted)	.....	1,200.00	1,200.00
Draftsman on works of improvement, at $5 per diem	1,535.00	.....	.....
Leveler on works of improvement, at $4 per diem	1,200.00	.....	.....
Quarterman wharf builder on works of improvement, at $4 per diem	1,081.16	.....	.....
Foremen tracks, at $5 per diem	200.00	.....	.....
Quarterman joiner on works of improvement, at $4 per diem	1,109.12	.....	.....
Quarterman laborer, at $2.48 per diem	399.04	.....	.....
Total	19,054.57	.....	18,576.00
SACKETTS HARBOR, N. Y.			
Ship-keeper, at $1 per diem*	365.00	1.00	365.00
LEAGUE ISLAND, PA.			
Clerk, at $1,400 per annum	1,400.00	1,400.00	1,400.00
Writer and telegraph operator, at $1,000 per annum	816.43	1,000.00	1,000.00
Messenger, at $2 per diem	626.00	2.00	626.00
Foreman (general), at $5 per diem (submitted)	1,252.00	5.00	1,565.00
Draftsman, at $5 per diem	1,425.00	.....	.....
Assistant draftsman, at $4 per diem	785.00	.....	.....
Leveler, at $3.84 per diem	1,194.24	.....	.....
Subinspector, at $3.50 diem	1,083.69	.....	.....
Do	976.50	.....	.....
Rodman, at $2.56 per diem	783.36	.....	.....
Total	10,342.22	.....	4,591.00

*Including Sundays.

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No. 8.—*Report showing amount expended during the fiscal year ending June 30, 1891, from appropriations pertaining to the Bureau of Yards and Docks, etc.*—Continued.

Navy-yards and rating, and rate of pay.	Amount paid to civilians employed during the fiscal year ending June 30, 1891.	Estimates for civilian employés for the fiscal year ending June 30, 1893.	
		Rate of pay.	Amount.
WASHINGTON, D. C.			
Clerk, at $1,400 per annum	$1,400.00	$1,400.00	$1,400.00
Messenger, at $2 per diem	626.00	2.00	626.00
Foreman (general), at $5 per diem (submitted)	1,244.00	5.00	1,565.00
Electrician to care for and be in charge of electric plant for electric lighting and fire alarm, at $1,000 per annum		1,000.00	1,000.00
Draftsman, at $5 per diem	355.00		
Total	3,625.00		4,591.00
NORFOLK, VA.			
Electrician, at $1,200 per annum (submitted)		1,200.00	1,200.00
Clerk, at $1,400 per annum	1,399.93	1,400.00	1,400.00
Writer, at $1,017.25 per annum	1,017.17	1,017.25	1,017.25
Writer, at $1,000 per annum	935.36	1,000.00	1,000.00
Foreman (general), at $5 per diem (submitted)	1,252.00	5.00	1,565.00
Mail messenger, at $2 per diem*	730.00	2.00	7.30
Two messengers, at $2 each per diem	1,252.00	2.00	1,252.00
Pilot, at $2.26 per diem	707.38	2.26	707.38
Draftsman, at $4.50 per diem (submitted)		4.50	1,408.50
Assistant draftsman, at $3.52 per diem	1,050.52		
Total	8,353.36		10,280.13
PORT ROYAL, S. C.			
Messenger to commandant, at $600 per annum (submitted)		600.00	600.00
PENSACOLA, FLA.			
Clerk, at $1,200 per annum	1,200.00	1,200.00	1,200.00
Mail messenger, at $2 per diem*	730.00	2.00	730.00
Total	1,930.00		1,930.00
MARE ISLAND, CAL.			
Clerk, at $1,400 per annum	1,400.00	1,400.00	1,400.00
Writer, at $1,017.25 per annum	1,017.25	1,017.25	1,017.25
Foreman mason, at $6 per diem	1,233.00	6.00	1,878.00
Foreman (general), at $5.50 per diem	1,713.25	5.50	1,721.50
Pilot, at $4.80 per diem	1,502.40	4.80	1,502.40
Draftsman, at $5 per diem	1,555.00	5.00	1,565.00
Mail messenger, at $2.74 per diem (submitted)*	730.00	2.74	1,000.10
Messenger, at $2 per diem	626.00	2.00	626.00
Messenger and lamplighter, at $2 per diem	626.00	2.00	626.00
Electrician, to be in charge of electric plant for electric light, at $1,200 per annum		1,200.00	1,200.00
One trimmer for electric lamp, at $2.24 per diem (submitted)*			817.60
Two firemen for electric plant, at $3.20 per diem each (submitted)*			2,336.00
Total	10,402.90		15,689.85
KEY WEST, FLA.			
Messenger, at $600 per annum	600.00	600.00	600.00

* Including Sundays.

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Recapitulation of expenditures for certain employés for the fiscal year ending June 30, 1891, and estimates for the fiscal year ending June 30, 1893, per act approved January 30, 1885.

Navy-yards and stations.	Expenditures, 1890-'91.	Estimates, 1892-'93.
Portsmouth, N. H	$8,281.50	$7,555,00
Boston, Mass	5,662.10	5,696.76
Sacketts Harbor, N. Y	365.00	365.00
Brooklyn, N. Y	19,054.57	18,576.00
League Island, Pa	10,342.22	4,591.00
Norfolk, Va	8,353.36	10,280.13
Washington, D. C	3,625.00	4,591.00
Port Royal, S. C		600.00
Pensacola, Fla	1,930.00	1,930.00
Key West, Fla	600.00	600.00
Mare Island, Cal	10,402.00	15,689.85
Total	68,616.65	70,474.74

No. 9.—*Statement of the appropriations for the Bureau of Yards and Docks for the fiscal year ending June 30, 1891, showing the amounts expended under each specific head of appropriation and the balances remaining unexpended June 30, 1891, as required by section 429, Revised Statutes.*

Appropriation for general maintenance, 1891	$230,000.00
Expended from July 1, 1890, to June 30, 1891	201,881.32
Balance on hand July 1, 1891	28,118.68
Which will be entirely absorbed.	
Appropriation for repairs and preservation, 1891	250,000.00
Expended from July 1, 1890, to June 30, 1891	235,679.58
Balance on hand July 1, 1891	14,320.42
Which will be entirely absorbed.	
Appropriation, civil establishment, 1891	53,986.04
Expended from July 1, 1890, to June 30, 1891	52,876.12
Balance on hand July 1, 1891	1,109.92
Which will revert to the Treasury.	
Appropriation for contingent, 1891	20,000.00
Expended from July 1, 1890, to June 30, 1891	17,394.38
Balance on hand July 1, 1891	2,605.62
Which will revert to the Treasury.	
Appropriation for Naval Home, 1891	73,115.00
Expended from July 1, 1890, to June 30, 1891	57,477.77
Balance on hand July 1, 1891	15,637.23
After liabilities are paid, balance will revert to Treasury.	
Appropriation, navy-yard, Portsmouth, N. H.:	
For increasing water supply	6,350.00
For completing hydrant system	6,080.00
For reconstructing buildings, Nos. 45 and 46	50,000.00
	62,430,00
Expended from July 1, 1890, to June 30, 1891	41,379.57
Balance on hand July 1, 1891	21,050.43
Which will be entirely expended	
Appropriation, navy-yard, Boston, officer's quarters	28,610.00
Expended from July 1, 1889, to June 30, 1891	28,610.00
Appropriation, navy-yard, Boston, pumping machine, etc	50,000.00
Expended from July 1, 1890, to June 30, 1891	1,330.13
Balance on hand July 1, 1891	48,669.87
Which will be entirely absorbed.	

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Appropriation, navy-yard, Brooklyn, N. Y.:	
For improving Whitney Basin	$40,000.00
For railroad throughout the yard	15,000.00
Expended from July 1, 1889, to June 30, 1891	55,000.00
Appropriation, navy-yard, Brooklyn, N. Y.:	
For extending railroad system and necessary rolling stock	5,000.00
For completing approaches to timber dry dock	25,000.00
For repairing cob dock, improvement of Whitney Basin, rebuilding sea wall and dredging	125,000.00
For relaying water pipes in the yard	15,000.00
	170,000.00
Expended from July 1, 1890, to June 30, 1891	114,744.27
Balance on hand July 1, 1891	55,255.73
Which will be entirely expended.	
Appropriation for timber dry docks, navy-yards, Brooklyn, N. Y., and Norfolk, Va.	1,100,000.00
Expended from July 1, 1888, to June 30, 1891	1,100,000.00
Appropriation, navy-yard, League Island, Pa.:	
For improvement on grounds and construction of protection wall	75,000.00
Expended from July 1, 1888, to June 30, 1891	75,000.00
Appropriation, navy-yard, League Island, Pa.:	
For timber dry dock	550,000.00
Expended from July 1, 1888, to June 30, 1891	548,832.43
Balance on hand July 1, 1891	1,167.57
Which will be expended in completing the work.	
Appropriation, navy-yard, League Island, Pa.:	
For rebuilding Broad Street wharf	86,416.40
For dredging and filling in	75,000.00
For building and furnishing officers' quarters	10,000.00
For dredging and filling in and paving and improvement of grounds	25,000.00
For extending permanent sea wall	25,000.00
For construction of light retaining wall	25,000.00
	246,416.40
Expended from July 1, 1890, to June 30, 1891	57,304.75
Balance on hand July 1, 1891	189,111.65
Which will be entirely absorbed.	
Appropriation, navy-yard, Washington, D. C.:	
For changing building No. 7, into an apartment house of three stories	10,000.00
For dredging and filling in	5,000.00
Expended from July 1, 1890, to June 30, 1891	5,012.53
Balance on hand July 1, 1891	9,987.47
Which will all be expended.	
Appropriation, navy-yard, Norfolk, Va.:	
For building, by contract, two officers' quarters	16,000.00
Expended from July 1, 1889, to June 30, 1891	15,934.58
Balance on hand July 1, 1891	65.42
Which will be entirely expended.	
Appropriation, navy-yard, Norfolk, Va.:	
Iron and steel shop	75,000.00
Railroad extension	10,000.00
Boiler-shop extension	14,448.00
Water system	15,000.00
	114,448.00
Expended from July 1, 1888, to June 30, 1891	111,880.69
Balance on hand July 1, 1891	2,567.31
Which will be entirely expended.	

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Appropriation, navy-yard, Norfolk, Va.:	
For completing railroad system	$5,000.00
For completing water system	5,000.00
For completing approaches to timber dry dock	10,000.00
For extending machine shop for steam engineering	5,000.00
For connecting new pumps with old dry dock	15,000.00
	40,000.00
Expended from July 1, 1890, to June 30, 1891	8,803.78
Balance on hand July 1, 1891	31,196.22
Which will be entirely expended.	
Appropriation, construction of dock, Port Royal, S. C.:	
Toward the construction of a timber dry dock	200,000.00
Expended July 1, 1890, to June 30, 1891	6,166.03
Balance on hand July 1, 1891	193,833.97
Which will be entirely expended.	
Appropriation, naval station, Key West, Fla.:	
For changing location of railroad scale house and pump house	1,000.00
Expended from July 1, 1890, to June 30, 1891	265.00
Balance on hand July 1, 1891	735.00
Which will be entirely expended.	
Appropriation, navy-yard, Mare Island, Cal., 1887:	
For granite dry dock	191,595.00
Expended July 1, 1886, to June 30, 1891	191,595.00
Appropriation, navy-yard, Mare Island, Cal.:	
For continuing work on granite dry dock	80,000.00
Expended from March 2, 1889, to June 30, 1891	80,000.00
Appropriation, navy-yard, Mare Island, Cal.:	
For finishing boiler and machine shop	4,200.00
For extending coal wharf	30,000.00
For mud scow	4,500.00
	38,700.00
Expended from July 1, 1888, to June 30, 1891	38,419.76
Balance on hand July 1, 1891	280.24
Which will be entirely expended.	
Appropriation, navy-yard, Mare Island, Cal.:	
For iron plating shop	5,755.40
For roads along water front and about shops	5,000.00
For extension of quay wall	55,000.00
	65,755.40
Expended from July 1, 1889, to June 30, 1891	52,483.90
Balance on hand July 1, 1891	13,271.50
Which will be entirely expended.	
Appropriation, navy-yard, Mare Island, Cal.:	
For bridge across sectional dock basin	2,000.00
For boat landings	3,000.00
For building wagon road towards cemetery and magazine	5,000.00
For replanking wharves	5,000.00
For completing electric-light plant	30,000.00
For moving ferry slip back, straightening sea wall, and dredging	20,000.00
For completing repairs to sectional dry dock	15,000.00
	80,000.00
Expended from July 1, 1890, to June 30, 1891	37,638.11
Balance on hand July 1, 1891	42,361.89
Which will all be expended.	

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Appropriation, adjustable stern dock, for naval station, Key West, Fla..	$30,000.00
Expended from July 1, 1889, to June 30, 1891	27,000.00
Balance on hand July 1, 1891	3,000.00
Which is held to pay reservation under the contract.	
Appropriation, electric lighting of navy-yards	60,000.00
Expended from July 1, 1889, to June 30, 1891	17,140.85
Balance on hand July 1, 1891	42,859.15
Which will be entirely expended.	
Appropriation, naval station, Key West, Fla.:	
For two houses, officers' quarters	8,000.00
Expended from July 1, 1889, to June 30, 1891	8,000.00
Appropriation, naval station, New London, Conn.:	
For rebuilding the wharf	6,500.00
Expended from July 1, 1890, to June 30, 1891	6,500.00
Appropriation, launching ways and slips, New York and Norfolk navy-yards:	
For extending launching ways and making alterations in granite slips	26,000.00
Expended from July 1, 1890, to June 30, 1891	12,278.19
Balance on hand July 1, 1891	13,721.81
Which will be entirely expended.	
Appropriation, commissions on new navy-yards and dry docks, Gulf of Mexico and South Atlantic and Pacific coasts, act of September 7, 1888.	15,000.00
Expended from September 7, 1888, to June 30, 1891	11,659.09
Balance on hand July 1, 1891	3,340.91
Which will revert to the Treasury.	
Appropriation, commissions on dry docks:	
Shores of the Pacific Ocean, waters of Puget Sound, and also Lakes Union and Washington, and also on the shores of the Gulf of Mexico and the waters connected therewith, act June 30, 1890	15,000.00
Expended from July 1, 1890, to June 30, 1891	14,515.73
Balance on hand July 1, 1891	484.27
Which will revert to the Treasury.	
Appropriation, increase of the Navy, traveling cranes:	
For two traveling cranes, of forty tons capacity, dry docks at New York and Norfolk	100,000.00
Expended from March 2, 1891, to June 30, 1891	428.42
Balance on hand July 1, 1891	99,571.58
Which will be entirely expended.	

Abstract and statement of offers received for contracts for improvements, materials, and services coming under the cognizance of the Bureau of Yards and Docks, as required by section 429, Revised Statutes.

Offers for dredging at navy-yard, Brooklyn, N. Y., under advertisement dated June 2, 1890:	
William H. Beard	*$20,760.00
P. Sanford Ross	23,850.00
Atlantic Dredging Company	21,600.00
Offers for dredging an entrance to the timber dry dock, at the navy-yard, League Island, Pa., under advertisement dated July 1, 1890:	
National Dredging Company	*$2,272.00
J. E. Simpson & Co	7,500.00
American Dredging Company	2,920.00
F. C. Somers	2,744.00

*Accepted.

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Offers for extending launching ways in front of ship-house E, navy-yard, Brooklyn, N. Y., under advertisement dated June 23, 1890:

Colin McLean	$9,500.00
Richard Cronin & Sons	*2,800.00

Offers for repairing pile wharf at naval station, New London, Conn., under advertisement dated July 14, 1890:

William H. Molthrop & Co	*$1,550.00
Donald Gunn	2,580.00

Offers for purchase and removal of ship-house D, at navy-yard, Brooklyn, N. Y., under advertisement dated July 14 1890:

R. G. Packard	*$100.00
Fred. Cohen	750.00

Offers for erecting and completing the bath rooms, bath tubs, and other work at U. S. Naval Home, Philadelphia, Pa., under advertisement dated July 29, 1890:

R. E. Henderson	*$750.00

Offers for repairs and alterations to house B, at U. S. Naval Station, New London, Conn., under advertisement dated August 2, 1890:

G. W. Hewett & Perey	$1,350.00
Frederick M. Sherman	1,175,00
Newman & Cronnin	950.00
Robert H. Burrows	*915.00
Nelson H. Burrows	925.00

Offers for rebuilding Broad street wharf, at League Island, Pa., under advertisement dated July 25, 1890:

Joseph S. Allen	†$55,409.00
Wm. A. Mundy	‡73,000.00
Philbert & Porter	89,637.50
Colin McLean	82,843.00
Fogg & Scribner	84,500.00

Offers for building two officers' quarters at navy-yard, League Island, Pa., under advertisement dated August 7, 1890:

Fogg & Scribner	$7,500.00
Jas. A. O'Donnell	§13,700.00
R. A. Robbins	18,487.00

Offers for protection wall at navy-yard, League Island, Pa., under advertisement dated August 4, 1890:

Fogg & Scribner	$23,500.00
F. A. Smith	25,800.00
Colin McLean	*19,190.00
William A. Mundy	21,800.00

Offers for installing an electric-light plant at the navy-yard, Mare Island, Cal., under advertisement dated July 15, 1890:

Edison General Electric Company	$54,900.00
Edison General Electric Company	39,625.00
Edison General Electric Company	54,950.00
Thomson-Houston Electric Company	*44,900.00

Offers for dredging at the U. S. navy-yard, Norfolk, Va., under advertisement dated August 22, 1890:

C. T. Caler	per cubic yard	‖$0.13½
P. Sanford Ross	do	*.14½
Morris Cummings	do	.16

Offers for iron and steel work for machine-shop extension at the U. S. navy-yard, Norfolk, Va., under advertisement dated August 18, 1890:

S. C. Forsaith Machine Company	*$1,887.00

Offers for piling, pile capping, etc., for marine railway at navy-yard, Norfolk, Va., under advertisement dated September 8, 1890:

W. B. Brooks, jr	$3,750.00
Holtzclaw Bros	*2,369.00

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*Accepted.
† Rejected, being irregular and incomplete.
‡ Accepted and awarded as advertised by Department.
§ No award.
‖ Informal.

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Offers for constructing new pumps with old dry dock at navy-yard, Norfolk, Va., under advertisement dated August 8, 1890:

Crook Horner & Co	*$14,809.82

Offers for pumping plant at the U. S. navy-yard, Boston, Mass., under advertisement dated August 6, 1890:

Holly Manufacturing Company	$156,400.00
Southwark Foundry & Machine Company	*49,890.00
Samuel T. Pope & Co	34,197.00
Do	35,243.00
Do	2,000.00
Do	4,800.00

Offers for completing approaches to timber dry dock at navy-yard, Norfolk, Va., under advertisement dated September 6, 1890:

Holtzclaw Bros.:	
Item A‡	$11,579.00
Item B	1,220.00
Item C	5,849.00

Offers for a hydraulic passenger elevator for the U S. Naval Home, Philadelphia, Pa., under advertisement dated September 18, 1890:

Whittier Machine Company	$5,978.00
Stokes & Parrish Electric Company	4,416.00
Do	4,116.00
Do	4,200.00
Do	3,900.00
George C. Howard	*2,760.00
Otis Bros. & Co	4,700.00

Offers for dredging at the U. S. navy-yard, Mare Island, Cal., under advertisement dated September 24, 1890:

Pacific Coast Dredging and Reclamation Company	†$15,000.00
San Francisco Bridge Company	15,900.00

Offers for timber dry dock at naval station, Port Royal, S. C., also for floating dry dock, to be delivered at same station, under advertisement dated July 25, 1890:

Justin McCarthy	*$418,915.67
R. G. Packard	471,000.00
J. E. Simpson & Co	497,539.00
Carlos Stolbrand	326,620.00

Offers for dredging at navy-yard, Brooklyn, N. Y., under advertisement dated October 18, 1890:

William H. Beard	per cubic foot	*$0.17½
R. G. Packard	do	0.22

Offers for the installation of an electric-lighting plant at U. S. navy-yard, Brooklyn, N. Y., under advertisement dated November 10, 1890:

Western Electric Light Company	$4,350.00
Thomson-Houston Electric Company	20,550.00
The Fort Wayne Electric Company	†13,700.00
Brush Electric Light Company	21,100.00

Offers for two officers' quarters at navy-yard, League Island, Pa., under advertisement dated November 20, 1890:

James A. O'Donnell	*$9,270.00

Offers for changing building No. 7 at the navy-yard, Washington, D. C., under advertisement dated December 10, 1890.

Halliday & Richardson	$8,962.00
Plager & Acorn	10,753.00
William Rothwell	9,888.00
Charles C. Meads	10,000.00
James L. Parsons	9,977.00
William A. Vaughn	9,920.00
F. H. Duehay	‡8,300.00
John H. Howlett	10,000.00
William Z. Partello	9,974.00
Arthur W. Sweeney	*8,855.00
James M. York & Son	11,995.00
Henry F. Getz	§11,000.00

*Accepted. †No award. ‡Informal. §Bid not signed.

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Offers for the installation of an electric-lighting plant at the navy-yard, Norfolk, Va., under advertisement dated December 22, 1890:

Edison General Electric Company	$26,200.00
Do	19,900.00
Do	25,800.00
Do	19,100,00
Western Electric Company	*13,676.00

Offers for dredging at the navy-yard, Mare Island, Cal., under advertisement dated December 15, 1890:

Pacific Coast Dredging and Reclamation Company..per cubic yard..	*$0.23

Offers for the construction of an iron roof frame for buildings 45 and 46, at the navy-yard, Portsmouth, N. H., under advertisement dated February 7, 1891:

Groton Bridge and Manufacturing Company	$8,000.00
James Flynn	8,275.00
The Vermont Construction Company	5,990.00
The Riverside Bridge and Iron Works	5,890.00
Haugh, Ketcham & Co. Iron Works	6,335.00
Wrought Iron Bridge Company	6,100.00
The Baldwin Iron Bridge Company	6,210.00
Rochester Bridge and Iron Works	5,987.00
Millikin Bros	6,487.50
S. C. Forsaith Manufacturing Company	8,720.00
David H. Andrews	*5,758.00

Offers for constructing a frame office building at the U. S. Naval Station, Port Royal, S. C., under advertisement dated February 18, 1891:

N. Christensen	†$6,875.00
William H. Bartless	7,400.00

Offers for construction of west dry-dock pier, at navy-yard, League Island, Pa., under advertisement dated May 12, 1891:

William Z. Partello	$82,354.30
Delaware Construction Company	76,763.38
Colin McLean	88,950.00
Isaac F. Rotan	74,890.00
James S. Allen	76,483.00
William A. Mundy	*71,000.00
Davis & Irwin	92,441.00

Offers for constructing paint-shop building, No. 16, into two officers' quarters, at navy-yard, Washington, under advertisement dated April 22, 1891:

William Z. Partello	$10,084.69
A. W. Sweeney	11,338.00
William W. Winfree	8,400.00
William Rothwell	*7,930.00
A. J. Fisher	8,991.00
William Lawson & Bro	8,754.00
S. T. Thomas	‡7,788.00

Offers for 40-ton cranes, one at the navy-yard, Brooklyn, N. Y., and one at the navy-yard, Norfolk, Va., under advertisement dated April 17, 1891:

Yale & Towne Manufacturing Company	$92,200.00
Morgan Engineering Company	79,966.25
Southwark Foundry and Machine Company	71,522.00
Weimer Machine Works Company	104,300.00
American Ship Windlass Company	77,708.00
William Sellers & Co	*55,465.00

*Accepted. †No award made. ‡Informal.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Yards and Docks, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
MAINTENANCE YARDS AND DOCKS, 1893.			
For general maintenance of yards and docks namely: For freight, transportation of material and stores; books, maps, models, and drawings; purchase and repair of fire engines; machinery; repairs on steam fire engines and attendance on the same; purchase and maintenance of oxen, horses, and driving teams; carts, timber wheels, and all vehicles for use in navy-yards; tools and repairs of the same; postage on letters and other mailable matter in public service sent to foreign countries, and telegrams; stationery; furniture for Government houses and offices, and heating and lighting the same in the navy-yards; coal and other fuel; candles, oil, gas, and electric lighting; cleaning and clearing up yards and care of buildings; attendance on fires, lights, fire engines, and apparatus; for incidental labor at navy-yards; water tax; tolls, and ferriage; rent of four officers' quarters at Philadelphia, Pa.; pay of watchmen in navy-yards; awnings, and packing boxes, and advertising for yards and docks and other purposes. Submitted (March 2, 1891)	$230 000.00	$260,000.00	$230,000.00
CONTINGENT YARDS AND DOCKS, 1893.			
For contingent expenses, to meet emergencies that may arise at navy yards and stations. Submitted (March 2, 1891)	20,000.00	20,000.00	20,000.00
		280,000.00	250,000.00
NAVAL HOME, PHILADELPHIA, PA.			
One superintendent (same act)	600.00		
One steward. Increase of $120, submitted (same act)	600.00		
One matron. Increase of $120, submitted (same act)	480.00		
One chief cook (same act)	360.00		
One assistant cook (same act)	240.00		
One assistant cook (same act)	180.00		
One chief laundress (same act)	192.00		
Four laundresses, each $168 (same act)	672.00		
Four scrubbers, each $168 (same act)	672.00		
Eight waiters, each $168 (same act)	1,344.00		
Eight laborers, each $240 (same act)	1,920.00		
One master-at-arms. Increase of $120, submitted (same act)	600.00		
Two house corporals. Increase of $60 each, submitted (same act)	720.00		
One engineer to run elevator (same act)	600.00		
One stable-keeper and driver (same act)	360.00		
One barber (same act)	360.00		
One painter (same act)	600.00		
One carpenter (same act)	845.00		
Water rent and gas (same act)	2,400.00		
Repairs to buildings, furnaces, grates, ranges, furniture, and repairs of furniture (same act)	5,000.00		
Cemetery, burial expenses, and headstones (same act)	350.00		
Improvement of grounds (same act)	500.00		
Transportation of indigent and destitute beneficiaries to the Home (same act)	500.00		
Music in chapel (same act)	600.00		
Support of beneficiaries (same act)	56,600.00		
		77,295.00	71,215.00
REPAIRS AND PRESERVATION, 1893.			
For navy-yards and stations (same act)	300,000.00	300,000.00	300,000.00
NAVY-YARDS AND STATIONS.			
Navy-yard, Portsmouth, N. H.:			
For coal pocket for storage of coal. Submitted (same act)	6,500.00		
For boiler house for buildings, Nos. 45, 46. Submitted (same act)	7,000.00		
		13,500.00	22,287.00
Navy-yard, Boston, Mass			17,000.00
Navy-yard, Brooklyn, N. Y.:			
Quay wall, extension of cob dock (same act)	60,000.00		
Quay wall, Whitney Basin, from B. to C. (same act)	67,150.75		
		137,150.75	126,835.00

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Estimates of appropriations required, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
NAVY-YARDS AND STATIONS—continued.			
Navy-yard, League Island, Pa.:			
For extension of protection wall. Submitted (same act).	$20,000.00		
For extension of light retaining wall (same act)	15,000.00		
For riprap, Broad street wharf (same act)	6,500.00		
For branch sewer (same act)	2,100.00		
		$43,600.00	$127,276.62
Navy-yard, Washington, D. C.:			
For repair of breech-mechanism shop. Submitted (same act)	15,000.00		
		15,000.00	21,788.09
Navy-yard, Norfolk, Va.:			
For floating gate for granite dock. Submitted (same act).	25,000.00		
For coal shed, submitted (same act)	6,500.00		
		31,500.00	29,166.00
Naval station, Port Royal, S. C.:			
For three officers' quarters. Submitted	7,500.00		
For telegraph and telephone lines. Submitted	1,500.00		
For hospital building. Submitted	2,000.00		
For water closets, Submitted	250.00		
For general storehouse. Submitted	2,000.00		
		13,250.00	
Navy-Yard, Mare Island, Cal.:			
For two 12-ton pillar wharf cranes. Submitted (same act)	7,682.56		
For extension of quay wall. Submitted (same act)	20,000.00		
For yard roads. Submitted (same act)	5,000.00		
For locomotive for yard use. Submitted (same act)	4,000.00		
For replanking wharves. Submitted (same act)	3,168.14		
For Smead dry-air closets near building No. 41. Submitted (same act)	4,456.13		
For pointing up granite work of dry dock. Submitted (same act)	5,000.00		
For oil house for general storekeeper. Submitted (same act)	11,554.00		
For repairs to steam-engineering buildings. Submitted (same act)	4,797.75		
		65,658.63	51,785.24
Increase of the Navy:			
For two cranes, 40-ton capacity, for the League Island (Pa.) and Mare Island (Cal.) navy-yards	110,000.00		110,000.00
Construction of dock, Port Royal, S. C. (same act)	150,000.00	150,000.00	150,000.00
In addition to the sum of $150,000 provided by the act making appropriations for the naval service for the fiscal year ending June 30, 1892, and for other purposes, toward the construction of a timber dry dock at the coaling station, Port Royal, S. C., in accordance with the recommendation of the commissioners to report as to the most desirable location on or near the coast of the Gulf of Mexico and the South Atlantic coasts for navy-yards and dry docks, the further sum of $150,000, or so much thereof as may be necessary, is required to meet payments under a contract authorized by the Secretary of the Navy, in accordance with law, for the construction of said timber dry dock and the following items incidental thereto: Change location of naval wharf, erection of office buildings, pay of superintendents and inspectors, necessary dredging, incidental expenses, unforeseen emergencies and contingencies, and for protection to dry-dock entrance and wharf.			
Launching ways and slips, New York and Norfolk navy-yards (same act)			13,000.00
Dry dock, Puget Sound, Wash			210,000.00
		469,659.38	869,138.05
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.:			
One clerk, at $1,400 per annum (March 2, 1891)	1,400.00		
One mail messenger, at $2 per diem* (same act)	730.00		
One messenger, at $600 per annum (same act)	600.00		
One foreman, at $4 per diem* (same act)	1,460.00		
One janitor, at $600 per annum (same act)	600.00		
One pilot, at $3 per diem (same act)	1,095.00		
One foreman mason, when required, at $4.50 per diem (same act)	1,413.00		
		7,298.00	7,307.00

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Estimates of appropriations required, etc.—Continued.

Detailed objects of expenditure, and explanatioons.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
CIVIL ESTABLISHMENT—continued.			
Navy-yard, Boston, Mass.:			
One clerk, at $1,400 per annum (same act)	$1,400.00		
One foreman, at $4 per diem (same act)	1,252.00		
One messenger to commandant, at $1.76 per diem (same act)	550.88		
One messenger, at $1.76 per diem (same act)	550.88		
One mail messenger, at $2 per diem (same act)	730.00		
One writer, at $900 per annum (same act)	900.00		
		$5,383.76	
Naval station, Sacketts Harbor, N. Y.:			
One shipkeeper, at $1 per diem* (same act)	365.00		
		365.00	$366.00
Navy-yard, Brooklyn, N. Y.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One writer, at $1,017.25 per annum (same act)	1,017.25		
Two masters of tugs, at $1,500 each per annum (same act)	3,000.00		
Two writers, at $900 each per annum (same act)	1,800.00		
One foreman, at $4.50 per diem (same act)	1,408.50		
One mail messenger, at $2 per diem* (same act)	730.00		
Two messengers, at $2.25 each per diem (same act)	1,408.50		
One draftsman, at $5 per diem (same act)	1,565.00		
One quarterman, at $3 per diem (same act)	939.00		
One superintendent of teams or quarterman, at $4 per diem (same act)	1,252.00		
One messenger to commandant at $2.25 per diem* (same act)	821.25		
One electrician, at $1,200 per annum. Submitted	1,200.00		
		16,541.50	15,366.75
Navy-yard, League Island, Pa.:			
One clerk, at $1,400 per annum	1,400.00		
One messenger, at $2 per diem	626.00		
One writer and telegraphic operator, at $1,000 per annum.	1,000.00		
One foreman, at $4 per diem	1,252.00		
		4,278.00	4,284.00
Navy-yard, Washington, D. C.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One messenger, at $2 per diem (same act)	626.00		
One foreman, at $4 per diem (same act)	1,252.00		
One electrician, at $1,000 per annum (same act)	1,000.00		
		4,278.00	4,284.00
Navy-yard, Norfolk, Va.:			
One clerk, at 1,400 per annum (same act)	1,400.00		
One writer, at 1,017.25 per annum (same act)	1,017.25		
One writer, at $1,000 per annum (same act)	1,000.00		
One foreman, at $4 per diem (same act)	1,250.00		
One mail messenger, at $2 per diem (same act)	730.00		
Two messengers, at $2 per diem each (same act)	1,252.00		
One pilot, at $2.26 per diem (same act)	707.38		
One electrician, at $1,200 per annum. Submitted	1,200.00		
		8,558.63	7,370.89
Navy-yard, Pensacola, Fla.:			
One clerk, at $1,200 per annum (same act)	1,200.00		
One mail messenger, at $2 per diem (same act)	730.00		
		1,930.00	1,932.00
Naval station, Key West, Fla..			
One messenger, at $600 per annum (same act)	600.00	600.00	600.00
Navy-yard, Mare Island, Cal.:			
One clerk, at $1,400 per annum (same act)	1,400.00		
One writer, at $1,017.25 per annum (same act)	1,017.25		
One foreman mason, at $6 per diem (same act)	1,878.00		
One foreman, at $5.50 per diem (same act)	1,721.50		
One pilot, at $4.80 per diem (same act)	1,502.40		
One draftsman, at $5 per diem (same act)	1,565.00		
One mail messenger, at $2 per diem* (same act)	730.00		
One messenger and lamplighter, at $2 per diem (same act)	626.00		
One electrician, at $1,200 per annum (same act)	1,200.00		
One messenger, at $2 per diem (same act)	626.00		
		12,266.15	12,236.45
		61,499.04	59,197.37

*Including Sundays.

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REPORT

OF

THE CHIEF OF THE BUREAU OF EQUIPMENT.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,
Washington, October 15, 1891.

SIR: I have the honor to submit the annual report of the operations of the Bureau of Equipment, together with the estimates for the fiscal year ending June 30, 1893, the annual reports of the Superintendent of the Naval Observatory and of the Superintendent of the Nautical Almanac, the latter two reports accompanied by estimates, respectively, for the support of the Naval Observatory and the Nautical Almanac Office, and the reports of the Naval Inspector of Electric Lighting and the Superintendent of Compasses.

During the past fiscal year fifty-three vessels have been either wholly or partly equipped under this Bureau at an expenditure of labor and material of $664,239.01.

Coal for ships' use and for the equipment shops at shore stations to the amount of 62,564 tons was purchased at a cost of $465,584.46.

Hemp for the manufacture of cordage to the amount of $226\frac{287}{2240}$ tons was purchased at a cost of $48,959.02.

The ropewalk at the Boston navy-yard has supplied, as usual, the wants of the service.

The equipment shops at the same yard have been employed in making anchors, chain cables, sails, rigging, etc., to meet the wants of the service.

Very respectfully,

GEORGE DEWEY,
Chief of Bureau.

The SECRETARY OF THE NAVY,
Washington, D. C.

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ANNUAL REPORT OF THE SUPERINTENDENT OF THE NAVAL OBSERVATORY.

U. S. NAVAL OBSERVATORY,
Washington, September 21, 1891.

SIR: In compliance with the order of the Bureau No. 3787, dated September 14, 1891, I have the honor to submit a report of the operations of the Observatory during the year ending June 30, 1891.

THE 26-INCH EQUATORIAL.

The observer on this instrument, Prof. Asaph Hall, U. S. Navy, has been engaged in completing his observations of double stars and in reducing and collecting these observations into a catalogue. This work is nearly accomplished. It is intended to make a new investigation of the periodical errors of the screw of the micrometer, and also to make some observations for the flexure and position of the instrument. This will close the work with this instrument before its removal to the new site.

For the reason stated above but few observations of satellites and other objects, except double stars, have been made. Some of these stars are close and difficult objects, which can be observed only on fine nights, and hence they have required a good deal of time.

THE TRANSIT CIRCLE.

This instrument, in charge of Prof. J. R. Eastman, U. S. Navy, was employed in observations of the sun, moon and planets, and such stars as were necessary for clock and instrument corrections. Observations of the list of stars for the Coast and Geodetic Survey were completed in 1890. Since July 1, 1890, 1,875 observations have been made with the transit circle. Of these 92 were of the sun, 53 of the moon, 48 of Mercury, 69 of Venus, 5 of Jupiter, and 5 of Saturn. The assistants on the transit circle were: Assistant Astronomers A. N. Skinner and Asaph Hall, jr.; Computers Charles S. McCoy and George A. Hill. The limited number of observers has prevented any work on the zone -14° to -18°.

The transit-circle work for 1887 is in type and that for 1888 will soon be ready for the printer. In addition to their work on astronomical reductions, the computers have reduced and prepared for publication, under Prof. Eastman's direction, the meteorological observations and results for the years 1883, 1884, 1885, 1886 and 1887. This meteorological work will form Appendix 3 to the volume for 1887. Of the reductions of the transit-circle work for 1889 more than half has been completed.

THE 9.6-INCH EQUATORIAL.

This instrument, in charge of Prof. Edgar Frisby, U. S. Navy, has been used in the observations of comets, asteroids, occultations of stars by the moon, and some miscellaneous observations of stars whose position needed identification. Observations of five different comets and of seven asteroids were made as often as possible; observations were also made of seven occultations of stars and of the transit of Mercury. The

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observations are all reduced to date and most of the results have already been communicated to astronomical journals.

Two nights in each week have been set apart for the accommodation of visitors.

THE TRANSIT OF MERCURY.

The transit of Mercury over the sun's disk, which occurred on May 9, 1891, was observed with the 9.6-inch equatorial by Prof. Frisby. The transit was only partial in the United States. On the Pacific coast the sun was two or three hours high at the time of the first and second contacts; it had set in most places on the Atlantic coast before the first contact, and in Washington it was only about ten minutes high. The afternoon of the day was quite cloudy, but just before the time of transit the clouds broke away and the first and second contacts were quite successfully observed; but, on account of the unfavorable circumstances and the sun's low altitude, the observations can not be very valuable, although the first indentation on the sun's limb was recorded on the chronograph.

In answer to a circular issued by the Observatory, requesting different astronomers throughout the country to observe the transit, responses were received from about twenty-five observers. The discussion of all these reports will doubtless increase our knowledge of the motion of this planet.

TRANSITS OF VENUS.

The reduction and discussion of the photographs of the transit of Venus, which occurred in December, 1882, is finished in the sense that results have been attained for the solar parallax and certain elements of the orbit of Venus, which are final, except in so far as they may be affected by possible small changes in the adopted longitudes of the various stations. Nevertheless some occultations of stars by the moon, telegraphic determinations of differences of longitude, tidal observations, and pendulum experiments still remain to be reduced, and as no funds are available for that purpose the work proceeds very slowly.

By the resolutions of April 10 and June 22, 1879, Congress provided for printing the observations of the transit which occurred in December, 1874, and under these resolutions Senate Ex. Doc. No. 31, Forty-sixth Congress, First session, containing 157 quarto pages, has been published, and 564 additional pages are now in type but have not yet been printed. Hitherto no provision has been made for printing the observations of the transit of December, 1882, but it is hoped that this may soon be done, because the work has now arrived at a stage where these observations should be introduced in order to show how a single result has been derived from the two transits. The meager statement of the results attained has been made in the report of the Superintendent of the Observatory for the year 1889, but until the observations are published in the detailed form adopted by other great nations the benefits accruing from the money already expended can not be fully realized.

SOLAR ECLIPSE OF 1893 APRIL 15.

On April 15, 1893, a total solar eclipse occurs under circumstances so favorable that its observation is extremely desirable. The central line of the shadow sweeps across South America, the Atlantic Ocean, and

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the northwestern part of Africa, and the duration of totality is $4^m\ 42^s$ near Ceara, Brazil, and $4^m\ 10^s$ near Bathurst, Senegambia. Many of the most important questions relating to the constitution of the sun can be studied only during total eclipses, and, as the whole time available for that purpose is only about three hours in a century, the necessity for utilizing every available eclipse is evident if we are ever to comprehend that wonderful orb upon which the very existence of the human race depends. It is hoped that means may be provided for sending at least one party to Ceara, and, if possible, another to Bathurst.

THE MERIDIAN TRANSIT INSTRUMENT.

The transit instrument has been constantly in use during the year for the daily observations to determine the errors of the standard-mean-time and other clocks for use in the transmission of standard time, and for the comparison of the chronometers. Observations have been taken with this instrument on every favorable night. The clocks continue to perform well, their rates seeming to follow the barometric movement more than any thermometric or hygrometric change.

A portable transit has been mounted and adjusted for use during the transfer and mounting of the large instrument at the new observatory.

The meridian transit instrument was in charge of Lieut. B. W. Hodges, U. S. Navy, until September 1, 1890, when he was relieved by Ensign Thomas Snowden, U. S. Navy. Ensign Hugh Rodman, U. S. Navy, assisted in the work with this instrument until relieved by Ensign H. H. Whittlesey, U. S. Navy.

CHRONOMETERS AND TIME SERVICE.

During the year 60 chronometers were issued, 37 turned in, 18 purchased, and 63 surveyed, of which 51 were sold and 12 retained for use in the Observatory.

Forty-six chronometers were repaired by the different firms and 20 are now undergoing repairs.

Of the chronometers owned by the government, 12 are in use at the Observatory, 53 are ready for issue, 17 await trial, 7 hack chronometers are ready for issue, 114 chronometers and 42 hacks are in use on naval vessels, 39 chronometers and 12 hacks are at the Mare Island observatory for issue to vessels, 17 chronometers and 20 hacks are in use on receiving ships, at shore stations, and for scientific purposes, 10 are held for survey, 17 are held for the Observatory museum, and 25 are awaiting repairs.

Besides the above instruments, there are 5 pocket chronometers, 23 watches, and 27 thermometers for issue, 2 watches requiring repairs; 8 watches and 2 thermometers are held for survey.

The Bureau of Equipment, having notified the several chronometer makers of the intention of the government to purchase a number of chronometers for the naval service, Messrs. T. S. & J. D. Negus submitted 16, John Bliss & Co. 13, H. H. Heinrich 8, and William Bond & Son 4 chronometers for competitive trial, of which number 18 were purchased. The trial of these chronometers began January 1, 1891, and was completed June 9, 1891. The results of the trial are appended in Table A.

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Besides this trial, two trials of repaired chronometers were held during the year, lasting three months each, the results of which are appended in Tables B and C. These trials were conducted in the same manner as those of preceding years, which have been described at length.

The time service has been satisfactory, the usual signals having been sent over the connecting wires, the same number of time-balls dropped, the Government clocks corrected, and the fire-alarm-circuit signals sent out, as formerly. This division of the Observatory, comprising the chronometers and the time service, was in charge of Lieut. Hiero Taylor, U. S. Navy, until May 1, when he was relieved by Ensign Thomas Snowden, U. S. Navy. Ensign H. P. Jones, U. S. Navy, and Ensign H. H. Whittlesey, U. S. Navy, have assisted in the chronometer work.

NAUTICAL INSTRUMENTS.

The instruments used in the navigation of ships have been carefully examined by Lieutenant-Commander Walton Goodwin, U. S. Navy, before acceptance, and distributed as directed by the Chief of the Bureau of Equipment.

A number of octants have been fitted with the telescope with large object-glass, for night observations. The binocular and spy glasses received during the year are of a quality superior to those formerly issued to the naval service.

A number of old chronometers, sextants, octants, and other instruments were condemned by survey as unserviceable, obsolete, and worn out, and were sold.

Two thousand three hundred and sixty permits were issued for a view of the heavens through the telescope.

MAGNETIC INSTRUMENTS.

The magnetic observations were under the charge of Ensign J. A. Hoogewerff, U. S. Navy. Ensign W. B. Hoggatt, U. S. Navy, was assistant until January 27, and Ensign R. E. Coontz, U. S. Navy, until June 30.

The self-recording magnetographs have been in operation continuously during the year, and the traces made by them developed, measured, and recorded. Experiments to determine the scale-values in terms of the force, and the temperature-corrections of the horizontal and vertical-force instruments, have been made as frequently as necessary throughout the year.

Observations of the absolute declination (variation of the compass) have been made twice a day during the year, between 9 and 10 a. m. and noon and 3:30 p. m, and the values of the base lines of the declination traces deduced from them.

Observations of the horizontal intensity of the earth's magnetic force have been made on four days of each month.

Two observations of the magnetic inclination (dip) have been made on each of the four days of each month on which the horizontal intensity was observed.

The actual number of the absolute observations is as follows: 503 observations of declination, 21 of horizontal intensity, and 84 of inclination.

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The results of the absolute observations have been reduced and combined with the continuous photographic records, and the absolute declination, horizontal force, and vertical force of the earth's magnetism were found and tabulated for each hour of the year.

The reduced observations for 1888 and 1889 have been published, and those for 1890 are now in the hands of the printer.

Two seismoscopes and a seismograph have been kept in working order during the year.

A report by Ensign C. C. Marsh, U. S. Navy, on "Some of the Magnetic Observatories of Europe" has been prepared for publication and is now at the Printing Office.

A continuous graphic record of the variation of the compass at this observatory since March 29, 1891, has been furnished to the Hydrographic Office, and has been published by it on the Monthly Pilot Chart of the North Atlantic Ocean.

LIBRARY AND PUBLICATIONS.

The library, together with the distribution of the publications of the Observatory, has remained in charge of Assistant Astronomer H. M. Paul.

The contents of the library at the beginning and end of the fiscal year 1890–91, with the additions during the year, were as follows:

	Volumes.	Pamphlets.	Total.
Contents, 1890 June 30	12,643	2,915	15,558
Additions	559	146	705
Contents, 1891 June 30	13,202	3,061	16,263

Of the 705 additions, 391 were received in exchange and 314 by purchase.

About 350 volumes have been bound during the year, but this does not suffice for the growth of the library. The binding has fallen very far behind, on account of the frequent suspension of work upon requisitions, and it is now practically two years in arrears. Some of the books now at the bindery have been there already more than eight months. The only apparent remedy for these difficulties is in granting the Observatory its own fund for binding, and a considerable increase in the estimate for the library has been submitted for this purpose, which it is hoped may have the approval of the Bureau and the Department.

The following publications have been distributed to the regular exchange lists:

1. The annual report of the Superintendent for 1890.
2. The Washington Observations for the year 1885.
3. The Washington Observations for the year 1886.
4. 1885, Appendix 3.—The Solar Parallax and its Related Constants, by Prof. Wm. Harkness, U. S. Navy.
5. 1886, Appendix 1.—Magnetic Observations, 1888–89, by Ensign J. A. Hoogewerff, U. S. Navy.

The annual volume for 1887 will shortly be ready for distribution, and that for 1888 is nearly ready for the printer.

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NEW NAVAL OBSERVATORY.

The new Naval Observatory buildings are not yet completed, and from present indications the removal from the old to the new Observatory will not be accomplished until July, 1892.

Very respectfully,

F. V. McNAIR,
Captain U. S. Navy, Superintendent.

The CHIEF OF THE BUREAU OF EQUIPMENT,
Navy Department.

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TABLE A.—*Record of competitive trial*

[In temperature room January 1 to March 14; after that to May

Relative number.	Time, 1891		Jan. 2 to Jan. 9.	Jan. 10 to Jan. 17.	Jan. 18 to Jan. 25.	Jan. 25 to Feb. 2.	Feb. 3 to Feb. 10.	Feb. 11 to Feb. 18.	Feb. 19 to Feb. 26.	Feb. 27 to Mar. 6.	Mar. 7 to Mar. 14.
	Temperature, Fahrenheit		45.04	54.95	70.03	85.09	90.04	85.01	69.98	55.03	45.30
	Relative humidity, per cent		65.3	66.4	68.8	69.9	68.0	68.6	69.3	69.6	70.1
	Chronometer maker.	*No.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
1	John Bliss & Co.....*a*	2827	−1.226	−1.324	−1.086	−1.646	−1.909	−1.617	−1.150	−1.243	−1.660
2	.....do.....*a*	2860	+0.596	+0.069	−0.371	−0.289	+0.190	+0.097	−0.114	−0.029	+0.269
3	T. S. & J. D. Negus ...*b*	1774	+0.524	+0.926	+0.771	+0.854	+1.127	+0.811	+0.386	+0.329	+0.876
4	.....do.....*b*	1783	+2.060	+2.176	+2.093	+1.676	+2.199	+1.704	+2.207	+2.150	+1.840
5	John Bliss & Co.....*a*	2843	+0.346	+0.319	+0.521	+0.569	+0.806	+0.633	+0.636	+0.757	+0.769
6	.....do.....*a*	2858	+1.381	+0.104	−0.228	+0.569	+1.056	+0.490	−0.150	+0.007	+0.840
7	Wm. Bond & Son .....*c*	425	−0.762	−0.360	+0.164	+0.319	+0.341	+0.490	+0.207	−0.457	−0.231
8	T. S. & J. D. Negus ...*d*	1764	+2.810	+1.961	+1.707	+2.497	+3.091	+2.490	+2.029	+2.400	+3.340
9	John Bliss & Co.....*a*	2829	+1.846	+1.069	+0.736	+0.211	+0.556	+0.633	+0.564	+1.114	+1.019
10	.....do.....*a*	2851	+1.810	+1.640	+0.807	+0.354	+0.663	+0.490	+0.707	+1.114	+1.519
11	.....do.....*a*	2837	−0.619	−2.253	−3.228	−2.967	−2.480	−3.010	−3.114	−2.207	−0.910
12	H. H. Heinrich.....*e*	1007	+1.953	+0.461	−0.050	+0.926	+1.199	+0.704	+0.064	+0.471	+1.519
13	Wm. Bond & Son .....*c*	504	+0.310	+1.997	+2.593	+3.033	+3.127	+3.026	+2.957	+1.864	+1.126
14	T. S. & J. D. Negus ...*b*	1776	+2.846	+2.283	+2.307	+1.854	+2.591	+2.633	+2.243	+2.436	+2.983
15	John Bliss & Co.....*a*	2792	−0.333	−0.681	+0.057	+0.140	+0.020	−0.046	+0.171	−0.529	−1.410
16	T. S. & J. D. Negus....*b*	1777	−0.404	−0.824	−0.550	−0.181	−0.087	−0.260	−0.150	−0.743	−0.410
17	.....do.....*d*	1801	+2.096	+1.533	+1.414	+2.319	+3.163	+2.597	+1.814	+2.007	+2.697
18	.....do.....*b*	1787	−0.476	+0.069	+0.093	+0.211	+0.413	−0.010	−0.721	−0.529	−0.410
19	.....do.....*b*	1780	−0.654	−1.574	−1.336	−1.146	−0.801	−1.010	−1.471	−1.636	−1.267
20	H. H. Heinrich.....*f*	1001	+0.131	−0.467	+0.271	+1.104	+1.270	+1.383	+0.421	+0.186	+0.307
21	T. S. & J. D. Negus ...*d*	1802	+1.453	+0.140	−0.764	−0.467	−0.051	−0.689	−1.079	−0.171	+1.161
22	.....do.....*d*	1765	+2.024	+0.604	−0.229	+0.783	+1.306	+0.954	+0.029	+0.686	+2.019
23	John Bliss & Co.....*a*	2850	+1.203	+0.069	−0.621	−0.967	−0.587	−1.189	−0.364	+0.614	+1.054
24	T. S. & J. D. Negus ...*b*	1782	+3.417	+2.604	+2.093	+1.997	+1.949	+2.847	+2.386	+2.686	+3.411
25	.....do.....*b*	1784	+1.596	+2.176	+2.807	+2.854	+3.484	+3.347	+3.457	+2.721	+2.697
26	.....do.....*d*	1718	+1.667	+0.247	−0.336	+0.997	+1.663	+1.204	+0.171	+0.686	+2.126
27	John Bliss & Co.....*a*	2855	+2.167	+0.890	−0.121	+1.069	+1.984	+1.633	+0.921	+0.900	+2.054
28	Wm. Bond & Son .....*d*	480	+0.453	−0.503	+0.307	+1.997	+2.627	+2.061	+0.529	+0.150	+0.876
29	H. H. Heinrich .....*g*	712	+0.560	+0.747	+1.236	+1.319	+2.020	+1.811	+2.171	+2.114	+1.997
30	John Bliss & Co.....*a*	2810	+2.417	+0.461	+0.414	+0.140	+0.127	−0.046	+0.564	+1.114	+1.554
31	H. H. Heinrich .....*h*	1005	+0.810	+0.461	+0.664	+0.568	+0.163	−0.260	+0.600	+0.686	+1.197
32	Wm. Bond & Son .....*i*	1009	+1.524	+1.461	+2.664	+2.854	+2.377	+2.454	+2.886	+2.257	+2.019
33	John Bliss & Co.....*a*	2852	+2.453	+1.926	+0.771	+1.176	+1.984	+1.454	+1.100	+2.400	+3.269
34	T. S. & J. D Negus ...*b*	1772	+0.810	+0.319	+0.236	+0.854	+1.306	+1.490	+1.636	+1.650	+2.126
35	H. H. Heinrich.....*e*	1002	+1.917	+1.033	−0.407	−1.217	−0.623	−1.153	−1.436	−0.207	+1.161
36	T. S. & J. D Negus ...*d*	1737	+2.560	+1.461	+1.093	+1.783	+2.413	+2.097	+2.457	+3.114	+3.626
37	H. H. Heinrich.....*j*	1003	+1.667	+1.890	+1.271	+1.604	+1.913	+1.169	+0.386	+0.436	+3.019
38	John Bliss & Co.....*a*	2828	+0.953	+1.033	+0.879	+0.211	+0.949	+1.097	+2.136	+2.114	+1.447
39	H. H. Heinrich.....*k*	1008	−1.154	−0.360	−0.121	+0.176	+0.341	+0.311	+1.993	−0.171	−0.267
40	T. S. & J. D. Negus ...*b*	1786	+0.310	+0.533	+0.736	+0.890	+0.984	+0.954	+0.529	+0.150	−0.089
41	H. H. Heinrich .....*l*	1004	−1.047	+0.783	−0.050	−1.360	−2.873	−3.153	−1.614	−0.850	−0.660

NOTE.—The sign + signifies losig; − signifies gaining.
a Ordinary balance with Bliss corrector.
b Ordinary balance with Negus correction.
c Hartnup balance.
d Ordinary balance.
e Heinrich regulator, white steel spring.
f Heinrich compensat ing weights, white steel spring.

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of chronometers, January to June, 1891.

23, in chronometer room; then in temperature room to June 9.]

Mar. 14 to Mar. 21.	Mar. 21 to Mar. 28.	Mar. 28 to Apr. 4.	Apr. 4 to Apr. 11.	Apr. 11 to Apr. 18.	Apr. 18 to Apr. 25.	Apr. 25 to May 2.	May 2 to May 9.	May 9 to May 16.	May 16 to May 23.	Temperature of compensation.	Temperature-constant.	First trial number.	Final trial number.	Relative number.
56.17	60.35	57.66	57.05	66.99	74.12	70.29	68.50	72.47	71.28					
63.0	66.1	65.7	64.1	72.4	63.4	57.6	59.1	65.0	68.9					
s.	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	°	*s.*			
−1.369	−1.369	−1.324	−1.150	−1.157	−1.266	−1.297	−1.467	−1.496	−1.620	66.17	−.00150	5.185	6.088	1
−0.083	−0.476	−0.431	−0.364	−0.943	−1.087	−1.011	−0.967	−1.139	−1.227	72.14	+.00091	3.574	6.363	2
+0.524	+0.560	+0.569	+0.279	+0.343	+0.091	+0.203	+0.319	+0.183	+0.094	64.93	+.00067	5.633	6.914	3
+2.096	+1.917	+2.104	+1.814	+1.521	+1.270	+1.631	+1.747	+1.754	+1.916	62.05	−.00099	5.705	7.385	4
+0.774	+0.846	+1.104	+0.850	+0.414	+0.234	+0.274	+0.211	+0.183	+0.059	94.72	−.00004	3.747	7.624	5
−0.119	−0.369	−0.324	−0.293	−0.621	−0.623	−0.583	−0.681	−0.531	−0.549	66.32	+.00213	8.350	8.870	6
−0.690	−0.511	−0.431	−0.436	+0.057	+0.270	+0.274	−0.039	+0.254	+0.273	86.20	−.00084	8.539	9.531	7
+2.274	+2.024	+2.140	+1.993	+1.807	+1.484	+1.560	+1.604	+1.611	+1.559	67.51	+.00208	8.483	10.609	8
+1.060	+1.060	+0.926	+0.743	+0.771	+0.413	+0.310	+0.176	+0.040	−0.477	93.35	+.00048	6.581	11.470	9
+0.917	+0.917	+0.997	+0.886	+0.664	+0.234	+0.667	+0.569	+0.326	+0.237	94.98	+.00064	10.399	11.481	10
−2.583	−2.797	−2.467	−2.436	−3.129	−3.223	−3.261	−3.146	−3.460	−3.549	75.09	+.00250	10.978	11.569	11
+0.560	+0.381	+0.176	+0.421	−0.157	−0.409	−0.369	−0.324	−0.389	−0.334	67.95	+.00280	10.321	12.346	12
+2.203	+2.489	+2.283	+2.136	+2.593	+2.806	+2.596	+2.426	+2.861	+2.630	83.97	−.00131	11.123	12.355	13
+2.453	+2.239	+1.961	+1.993	+1.700	+1.377	+1.381	+1.247	+1.040	+0.844	86.18	+.00012	8.231	12.755	14
−0.976	−0.690	−0.681	−0.650	−0.729	−0.551	−0.571	−0.610	−0.689	−0.763	76.24	−.00174	9.562	12.933	15
−0.940	−1.011	−1.039	−1.007	−0.943	−0.944	−1.011	−1.074	−0.853	−0.799	83.82	−.00068	12.090	13.035	16
+1.703	+1.631	+1.747	+1.707	+1.271	+1.449	+1.489	+1.426	+1.290	+1.166	64.84	+.00221	11.947	13.411	17
−0.440	−0.690	−0.646	−0.757	−0.693	−0.730	−0.833	−1.039	−0.853	−1.013	65.11	+.00111	12.886	13.711	18
−1.690	−2.190	−1.967	−2.043	−2.550	−2.194	−1.904	−1.717	−1.889	−1.977	37.98	+.00027	10.039	15.371	19
−0.047	−0.190	−0.289	−0.329	−0.264	−0.016	−0.333	−0.217	−0.210	−0.441	44.47	+.00090	13.435	15.412	20
+0.096	−0.404	−0.503	−0.471	−1.157	−1.694	−1.690	−1.646	−1.746	−1.727	73.39	+.00277	12.946	16.310	21
+0.667	+0.167	+0.390	+0.421	−0.336	−0.516	−0.333	−0.289	−0.389	−0.477	69.05	+.00379	15.465	16.910	22
+0.524	−0.047	+0.211	−0.007	−1.086	−1.516	−1.083	−1.039	−1.139	−1.191	112.07	+.00057	16.031	20.521	23
+2.881	+1.987	+2.640	+3.100	+2.664	+2.806	+2.917	+1.926	+2.147	+2.809	72.87	+.00130	11.419	21.191	24
+2.739	+2.703	+2.283	+2.207	+2.557	+2.877	+2.631	+2.461	+2.647	+2.487	76.86	−.00158	20.123	22.226	25
+0.810	+0.917	+1.247	+1.350	+0.843	+0.841	+0.881	+0.890	+0.861	+0.809	67.27	+.00383	20.803	22.817	26
+0.667	+0.631	+0.890	+0.957	+0.629	+0.913	+1.024	+1.247	+1.111	+0.987	67.65	+.00320	21.626	23.755	27
−0.047	−0.190	−0.217	−0.257	−0.229	+0.020	−0.369	−0.467	−0.317	−0.477	53.61	+.00224	23.165	26.532	28
+1.739	+1.739	+1.604	+1.493	+1.307	+1.127	+1.167	+1.211	+1.147	+1.201	72.46	−.00091	27.849	30.013	29
+0.846	+0.881	+1.104	+1.529	+0.700	+0.056	+0.239	+0.247	−0.317	−0.477	30.53	−.00031	21.483	30.537	30
+0.739	+0.096	−0.181	−0.400	−0.764	−1.373	−1.583	−1.824	−1.996	−1.977	64.12	−.00118	14 886	31.943	31
+1.917	+2.167	+2.319	+2.243	+2.771	+3.484	+3.703	+3.854	+4.040	+4.201	75.77	−.00230	25.572	32.573	32
+0.953	+0.739	+1.176	+1.350	+0.129	−0.266	+0.024	+0.069	−0.031	+0.094	73.98	+.00356	31.668	33.448	33
+1.596	+1.703	+1.676	+1.636	+1.593	+1.449	+1.596	+1.604	+1.504	+1.487	65.06	+.00064	35.867	36.305	34
−0.654	−1.119	−1.289	−0.864	−1.050	−1.194	−1.297	−1.289	−1.281	−1.299	81.18	+.00238	35.207	42.698	35
+2.417	+2.060	+2.283	+2.279	+1.414	+1.306	+1.274	+1.319	+1.183	+1.130	73.87	+.00150	40.757	44.258	36
+2.060	+1.810	+1.283	+1.279	+1.236	+0.591	+0.310	−0.181	+0.076	+0.309	68.13	+.00197	32.817	44.262	37
+1.631	+1.024	+0.711	+0.493	+0.486	+1.341	+1.631	+1.354	+1.397	+1.523	61.22	−.00174	35.369	46.861	38
−0.690	−0.547	−0.539	−0.936	−0.229	+0.091	−0.047	−0.396	−0.710	−0.334	72.04	−.00420	75.646	79.132	39
−0.119	−0.154	−0.146	−0.221	−0.371	−0.480	−0.476	−0.574	−0.674	−0.763	1300.04	−.000008	78.687	81.334	40
−1.226	−1.511	−2.074	−3.543	−1.586	−2.801	−3.511	−3.289	−3.210	−3.441	43.12	−.00137	81.167	136.075	41

g Heinrich auxiliary self-adjusting balance; Giles non-magnetic shield.
h Ordinary balance, palladium spring.
i Paillard's non-magnetic balance, palladium spring.
j Ordinary balance, white steel spring.
k Plain compensation balance, palladium spring.
l Heinrich regulator, palladium spring.

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TABLE B.—*Record of trial of repaired chro*

[In temperature room from November 1 to De

Relative number.	Repaired by.	Time, 1890–91		Nov. 5 to Nov. 10.	Nov. 11 to Nov. 16.	Nov. 17 to Nov. 22.	Nov. 23 to Nov. 28.	Nov. 29 to Dec. 4.	Dec. 6 to Dec. 11.	Dec. 13 to Dec. 18.	Dec. 19 to Dec. 24.	Dec. 25 to Dec. 30.	Jan. 3 to Jan. 8.	Jan. 8 to Jan. 13.
		Temperature, Fahrenheit.		90°. 0	84°. 9	69°. 8	55°. 1	45°. 5	54°. 6	70°. 2	84°. 8	89.°0	54°. 5	56°. 5
		Relative humidity, per cent.....		70.0	67.9	63.3	70.1	69.0	71.2	67.8	67.2	57.5	.....	.....
		Chronometer-maker.	*No.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*
1	Bd.	Wm. Bond & Son.	218	+1.356	+0.908	+0.300	+0.568	+1.552	+0.982	+0.204	+0.706	+1.152	+0.974	+0.542
2	Bd.	....do	287	+1.806	+1.608	+1.950	+1.768	+2.102	+1.982	+2.104	+1.806	+2.152	+1.824	+1.442
3	Bl.	John Bliss & Co.	2817	+1.106	+0.858	+1.100	+0.518	+0.952	+0.632	+0.704	+0.506	+1.252	+1.374	+1.392
4	Bd.	Wm. Bond & Son.	290	+1.156	+1.308	+0.500	+0.468	+1.202	+0.882	+0.204	+0.506	+0.852	+0.824	+0.642
5	Bd.	....do	221	+1.356	+1.058	+0.250	—0.132	+0.102	+0.182	+0.654	+0.606	+0.552	—0.176	—0.108
6	Bl.	Barraud ..	2609	+0.806	+0.558	+0.400	+1.468	+3.202	+1.682	+0.454	+0.706	+0.902	+2.024	+1.442
7	Bl.	Dent.....	2394	+0.006	+0.558	+0.150	—0.432	—1.298	—0.468	+0.654	+1.006	+1.302	+0.174	+0.692
8	Bd.	Wm. Bond & Son.	292	+1.756	+1.458	+0.700	+0.618	+1.502	+0.832	+1.154	+1.406	+1.902	+1.624	+1.442
9	Bd.	Hutton ...	349	—0.044	—0.392	—0.500	+0.518	+1.502	+0.382	—0.946	—0.944	—0.298	+0.924	+0.442
10	Bl.	Dent.....	29480	—2.094	—1.842	—1.350	—0.582	+0.252	—0.018	—0.496	—1.744	—2.098	—0.776	—0.758
11	Bl.	Poole	2381	—1.194	—1.342	—1.100	+0.018	+1.602	+0.232	—0.746	—1.244	—0.598	+1.124	+0.342
12	Bl.	Dent.....	25568	—0.194	+0.558	+0.600	+1.018	+2.852	+0.682	+0.104	+0.306	—0.152	+0.624	+0.342
13	Bl.	Poole	1940	+0.556	+0.408	—0.550	—0.382	+0.302	—0.468	—1.296	—0.594	+0.202	—0.826	—0.608
14	Bl.	Usher & Cole.	464	+1.406	+1.308	+1.900	+3.218	+4.802	+2.832	+1.004	+0.756	+1.502	+3.024	+2.742
15	Bd.	Frodsham.	3276	+0.506	—0.392	—2.150	—1.532	—0.898	—1.368	—1.646	—0.694	—0.948	—2.526	—2.758
16	Bd.	Wm. Bond & Son.	339	+2.356	+1.108	—0.550	—0.032	+1.452	+0.632	+0.654	+1.756	+2.302	+0.824	+0.442
17	Bd.	....do	493	+3.806	+3.308	+1.250	+0.968	+0.602	+0.932	+1.654	+2.956	+4.102	+1.724	+1.142
18	Bd.	Frodsham.	2831	+4.256	+3.458	+2.300	+3.518	+4.302	+3.832	+3.054	+3.456	+3.102	+3.624	+2.742
19	Bd.	Wm. Bond & Son.	509	+2.856	+2.408	+0.300	+0.168	+0.152	+0.382	+1.054	+2.206	+2.502	+1.274	+0.992
20	Bl.	Penlington	1742	+0.656	—0.342	—0.050	+1.218	+2.752	+1.482	+0.054	—0.344	+0.702	+3.274	+1.042
21	Bl.	Crisp	2101	+2.856	+1.608	+3.400	—0.282	+0.152	—1.368	+0.654	+1.906	+2.902	+1.924	+1.142

TABLE C.—*Record of trial of repaired*

[In temperature room from January 1 to

Relative number.	Repaired by.	Time, 1891.....		Jan. 2 to Jan. 9.	Jan. 10 to Jan. 17.	Jan. 18 to Jan. 25.	Jan. 25 to Feb. 2.	Feb. 3 to Feb. 10.	Feb. 11 to Feb. 18.	Feb. 19 to Feb. 26.	Feb. 27 to Mar. 6.	Mar. 7 to Mar. 14.	Mar. 14 to Mar. 21.
		Temperature, Fahrenheit..		45°. 04	54°. 95	70°. 03	85°. 09	90°. 04	85°. 01	69°. 93	55°. 03	45°. 30	50°. 17	
		Relative humidity, per cent.....		65.3	69.4	68.8	69.9	68.0	68.6	68.3	69.6	70.1	63.9	
		Chronometer-maker.	*No.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	*s.*	
1	Neg.	T. S. & J. D. Negus.	1215	+1.453	+0.676	+0.664	+1.426	+1.627	+1.097	—0.636	+1.186	+2.054	+0.846	
2	Neg.	....do	1721	+1.739	+0.426	—0.193	+0.569	+0.949	+0.811	—0.007	+0.543	+1.733	+0.239	
3	Neg.	....do	1762	+2.453	+1.426	+1.343	+2.420	+3.270	+2.669	+1.886	+1.864	+2.519	+1.024	
4	Neg.	....do	1448	+0.810	—0.181	—0.371	+0.890	+1.663	+1.061	—0.186	+0.221	+0.911	—0.309	
5	Neg.	....do	1773	+1.953	+1.890	+0.950	+0.961	+1.127	+0.919	+1.279	+2.329	+2.804	+1.953	
6	Neg.	....do	1464	—0.119	—1.181	—1.193	—0.181	+0.699	+0.276	—0.543	—0.207	+0.840	—0.690	
7	Neg.	....do	1739	+3.381	+1.211	—0.229	+0.497	+0.877	+0.454	+0.100	+1.293	+2.733	+1.131	
8	Neg.	....do	1605	+0.024	+0.104	+0.486	+1.711	+2.449	+1.704	+1.171	+0.793	+1.090	+1.239	
9	Neg.	....do	729	+1.203	—0.253	—0.443	+0.783	+1.949	+1.204	+1.100	+1.864	+1.661	+0.346	
10	Neg.	....do	1283	—0.333	—1.431	—1.693	—0.576	—0.016	—0.724	—3.043	—3.243	—1.839	—3.261	
11	Neg.	....do	1748	—0.011	+0.426	+0.771	+0.569	+0.484	+0.740	+0.314	+0.436	+0.840	+1.024	

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nometers, November 1, 1890, to March 4, 1891.

cember 31; after that in chronometer room.]

Jan. 13 to Jan. 18.	Jan. 18 to Jan. 23.	Jan. 23 to Jan. 28.	Jan. 28 to Feb 2.	Feb. 2 to Feb. 7.	Feb. 7 to Feb. 12.	Feb. 12 to Feb. 17.	Feb. 17 to Feb. 22.	Feb. 22 to Feb. 27.	Feb. 27 to Mar. 4.	Temperature of compensation.	Temperature-constant.	First trial number.	Final trial number.	Relative number.
57°.7	59°.0	59°.4	61°.3	59°.6	60°.0	59°.5	64°.3	61°.9	54°.3					
s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.			
+0.338	+0.270	+0.164	+0.084	+0.154	+0.022	+0.164	−0.118	+0.004	+0.336	69.63	+.00241	7.720	9.295	1
+1.138	+1.420	+1.214	+1.384	+1.354	+1.522	+1.414	+1.282	+1.304	+1.436	67.20	−.00106	6.619	9.543	2
+1.488	+1.670	+1.714	+1.984	+1.904	+1.872	+2.014	+1.982	+1.954	+1.636	71.32	−.00122	12.556	13.258	3
+0.488	+0.470	+0.264	+0.534	+0.454	+0.422	+0.464	+0.832	+0.704	+0.486	67.88	+.00197	11.564	14.488	4
−0.162	−0.180	−0.286	−0.216	−0.146	−0.228	−0.436	−0.418	−0.446	−0.564	223.97	−.00009	15.069	15.870	5
+1.038	+1.070	+0.914	+0.884	+0.904	+0.872	+1.014	+0.632	+0.454	+1.386	75.15	+.00299	14.289	16.769	6
+0.738	+0.770	+0.864	+1.034	+0.754	+0.922	+0.914	+0.932	+0.854	+0.136	89.89	−.00103	16.216	17.632	7
+1.038	+1.070	+0.964	+0.684	+0.604	+0.372	+0.664	+0.032	+0.204	+0.986	52.78	+.00069	9.167	21.138	8
+0.088	+0.120	+0.064	+0.084	+0.454	+0.622	+0.414	+0.282	+0.354	+1.586	76.68	+.00273	17.883	21.380	9
−0.762	−0.730	−0.736	−0.566	−0.746	−0.728	−0.536	−0.668	−0.496	−0.814	27.13	−.00058	18.437	21.677	10
−0.062	+0.170	−0.236	−0.116	+0.004	−0.278	−0.136	−0.718	−0.646	+0.086	85.83	+.00148	18.213	23.997	11
+0.138	−0.030	−0.236	−0.266	−0.196	−0.378	−0.286	−0.618	−0.696	−0.064	75.30	+.00128	21.949	24.445	12
−0.462	−0.530	−0.436	−0.316	−0.446	−0.528	−0.336	−0.468	−0.396	−0.314	67.99	+.00297	22.686	25.425	13
+2.438	+2.420	+2.514	+1.984	+2.254	+2.172	+2.214	+1.582	+1.854	+2.836	83.08	+.00252	27.218	27.680	14
−3.012	−3.030	−2.936	−2.966	−3.196	−3.328	−3.336	−3.518	−3.746	−3.314	66.11	+.00404	27.423	29.983	15
+0.338	+0.420	+0.264	+0.284	+0.304	+0.222	+0.364	+0.232	+0.254	+0.336	64.69	+.00365	29.700	30.899	16
+0.688	+0.770	+0.714	+0.884	+0.654	+0.622	+0.514	+0.532	+0.404	+0.286	56.24	+.00268	21.168	32.626	17
+2.438	+2.470	+2.264	+2.384	+2.704	+2.622	+2.814	+2.332	+2.404	+3.436	70.77	+.00397	30.095	34.547	18
+0.888	+0.920	+0.764	+0.884	+0.754	+0.872	+0.814	+0.432	+0.554	+0.986	57.67	+.00297	31.105	39.114	19
+0.488	+0.070	+0.264	−0.116	−0.146	−0.228	+0.114	−0.418	−0.246	+0.436	82.61	+.00221	22.237	69.847	20
+0.438	−0.030	−0.136	−0.866	−1.096	−0.978	−1.286	−2.568	−2.096	−2.214	78.75	−.00579	107.10	323.19	21

chronometers January 1 to May 23, 1891.

March 14; after that in chronometer room.]

Mar. 21 to Mar. 28.	Mar. 28 to Apr. 4.	Apr. 4 to Apr. 11.	Apr. 11 to Apr. 18.	Apr. 18 to Apr. 25.	Apr. 25 to May 2.	May 2 to May 9.	May 9 to May 16.	May 16 to May 22.	Temperature of compensation.	Temperature-constant.	First trial number.	Final trial number.	Relative number.
60°.35	57°.66	57°.05	66°.99	74°.12	70°.29	68°.50	72°.47	71°.28					
66.1	65.6	64.1	72.4	68.4	57.6	59.1	65.0	68.9					
s.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.			
+0.667	+0.961	+0.921	+0.629	+0.484	+0.239	+0.390	+0.397	+0.380	67.23	+.00197	8.553	9.578	1
−0.047	+0.069	+0.171	−0.371	−0.337	−0.440	−0.396	−0.389	−0.477	68.90	+.00304	10.740	10.976	2
+0.667	+0.676	+0.779	+0.486	+1.091	+0.881	+0.640	+0.826	+0.666	62.96	+.00218	13.367	14.599	3
−0.511	−0.253	−0.150	−0.336	−0.230	−0.404	−0.396	−0.103	−0.191	65.39	+.00343	16.941	17.929	4
+1.703	+1.819	+1.743	+1.379	+0.877	+1.131	+1.069	+0.861	+0.916	80.70	+.00182	19.248	20.136	5
−0.619	−0.610	−0.721	−1.264	+0.873	−0.976	−1.039	−0.996	−0.977	64.87	+.00240	22.930	25.050	6
+0.667	+0.854	+1.064	−0.086	−0.587	−0.226	−0.074	−0.174	−0.191	73.16	+.00411	23.336	25.108	7
+0.953	+0.854	+0.886	+0.986	+1.020	+0.917	+1.247	+0.611	−0.013	51.06	+.00111	19.237	30.154	8
−0.047	−0.324	−0.364	−0.479	+0.056	−0.511	−0.324	−0.067	−0.013	66.33	+.00197	44.609	48.404	9
−3.690	−3.681	−3.614	−3.800	−3.837	−4.511	−4.396	−4.281	−4.299	62.75	+.00386	64.127	68.437	10
+0.953	+0.819	+0.921	+0.986	+0.841	+0.846	+0.711	+0.719	+0.701	Indeterminate.				11

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ANNUAL REPORT OF THE SUPERINTENDENT OF THE NAUTICAL ALMANAC.

NAUTICAL ALMANAC OFFICE,
BUREAU OF EQUIPMENT, NAVY DEPARTMENT,
Washington, October 1, 1891.

SIR: I have the honor to submit the following report of the work of this office during the past year:

PRINTING.

The American Nautical Almanac for 1894 was issued in April, 1891.

The American Ephemeris for 1894 was issued in July, 1891.

The Atlantic Coaster's Nautical Almanac and the Pacific Coaster's Nautical Almanac for 1892 were issued in September, 1891. Of the Ephemeris and Nautical Almanac for 1895, 299 pages are now in type.

DISTRIBUTION.

During the fiscal year ending June 30, 1891, the sale and distribution of publications were as follows:

Publications.	Sold.	Distributed.	Issued to the public service.	Total issue.
American Ephemeris	592	390	461	1,443
American Nautical Almanac	2,108	.....	181	2,289
Atlantic Coaster's Almanac	679	.....	68	747
Pacific Coaster's Almanac	977	.....	28	1,005

The proceeds of sales amounting to $1,399.63 have, in compliance with law, been deposited in the Treasury to the credit of the appropriation for public printing and binding.

The sales of the American and Coaster's Almanacs have remained nearly unchanged for the past seven years. They are much smaller than should have been expected, and their paucity leads me to recall the history of the subject.

Previous to the establishment of this office the American merchant marine made extensive or exclusive use of a partial reprint of the British Nautical Almanac by Mr. G. W. Blunt. Naturally no claim for scientific or typographic accuracy could be successfully made for such a publication, and the errors which unavoidably crept into it afforded one reason for preparing an official ephemeris. In 1857 a contract was made with Mr. Blunt by which he discontinued his nautical almanac and accepted the general and exclusive agency for the sale of the official one.

The annual sales under this arrangement are stated to have exceeded 11,000 copies, but I can find no precise official statement on the subject.

On Mr. Blunt's retirement from business in 1867, a sales agent was appointed in each of the principal seaports, who supplied not only the shipmasters directly, but other dealers as well. This policy naturally gave rise to complaints from the latter, who sometimes did a larger business than the agent himself, and claimed the right to receive almanacs at the discount allowed to agents. These complaints seemed so reasonable that the system of exclusive agencies was abolished in 1883,

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and all dealers given equal rights to receive publications at agent's discount. In 1876 the annual sales of the American Nautical Almanac were from 4,000 to 6,000 copies. In 1879 3,210 copies were sold. During the next four years they fell off yet further to an average of about 2,200 copies.

This diminution was supposed to afford an index to the continued diminution in the number of American ships engaged in deep-sea voyages. But there was reason to believe that the falling off was largely due to the preparation and issue of partial and imperfect reprints of the most essential portions of the Nautical Almanac and other Government publications by dealers in nautical supplies, who were moved to this course less by the profits on sales than by that from advertisements and by the necessity of advertising their business in competition with their rivals in trade. These publications were smaller and cheaper than the Official Nautical Almanac, and therefore tended to supersede the latter except in the case of ships making long ocean voyages.

Under these conditions it seemed accordant with the general policy adopted by the Government in the establishment of the Hydrographic and Nautical Almanac Offices, of supplying navigators with all scientific data necessary in navigation, that an almanac designed especially for the coasting trade should be issued. But before deciding on this course it was sought to avoid any serious competition with private enterprise. Accordingly all known publishers of private nautical almanacs on the Atlantic coast were asked whether, in the event of an Official Coaster's Almanac being issued, they were ready to discontinue their own publications. All but one expressed a willingness to enter into this arrangement, provided the others did. As the desired unanimity failed by but one dissenting voice, the publication of the Atlantic Coaster's Almanac was commenced in 1884, with the belief that it would lead to the speedy discontinuance of private publications of the same kind.

This anticipation has not been realized. A private publication has the great advantage over a Government one that the issuer can "push" it, or give it away at pleasure, and compensate himself for the expense thus incurred by the resulting increase in value as an advertising medium. And as long as one dealer pursues this policy others feel constrained to follow him in self-defense. I propose during the present fiscal year to investigate the subject with a view of determining what change of policy, if any, should be introduced with respect to the Coaster's Nautical Almanac.

NEW TABLES OF THE PLANETS.

The work on material for these tables is now approaching a state at which all the good meridian observations at the leading observatories of the world since 1750 can be combined into a single homogeneous series and compared with Le Verrier's tables.

About 40,000 observations of the sun will be used and between 5,000 and 8,000 of each of the planets Mercury, Venus, and Mars. The reduction of all these observations is now substantially completed except some made at Greenwich between 1757 and 1765. The computations from Le Verrier's tables necessary for their comparison have also been completed and checked, except in the cases of a few isolated observations, and some series omitted in the original computations, which still need examination.

The work of the year has consisted very largely in testing or duplicating tabular computations with a view of detecting errors, and in completing some of the reductions.

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During the past three years I have placed most of the details of this work under the direction of Assistant Cleveland Keith. To his accuracy and ability in overseeing it is due the rapid and satisfactory progress it has made.

TABLES OF JUPITER AND SATURN.

The provisional tables of these planets, constructed by Assistant George W. Hill, have been compared with observations since 1750. Although the agreement is much better than in the case of any previous tables there are still some minute discrepancies which require investigation before the equations of condition are finally solved.

PUBLICATIONS.

Two parts of the series of Astronomical Papers, completing the second and third volumes have been issued from the press. Volume II, Part VI embodies a discussion of the observations of declination made with the great transit circles of the Royal Observatory, Greenwich, and of the U. S. Naval Observatory, Washington.. Observations with the former instrument were commenced in 1851; with the latter in 1866. The results do not admit of any condensed statement; but the discussion of each instrument leads to tables showing the difference between its results and the declinations of standard stars derived by Boss from all available observations between 1750 and 1870, and adopted in the American Ephemeris. The paper concludes with determinations of the constant of nutation from both instruments, which are hereafter to be combined with other determinations to obtain the best value of the constant for use in the new tables of the celestial motions.

Volume III, Part V contains the computations of the perturbations of the four inner planets by each other and by Jupiter, to be used in the new tables. The results agree remarkably with those of Le Verrier obtained by a different method, thus setting at rest doubts which have been expressed as to the entire accuracy of Le Verrier's results, and showing that the accuracy of the quantities now to be used is beyond question.

EFFICIENCY OF ASSISTANTS.

It is only just that I should ask attention to the remarkable disparity between the necessary qualifications of the assistants and the salaries paid them. A thorough mathematical training, an extensive acquaintance with astronomical computations, and great expertness in the use of figures are absolutely necessary; yet the salaries paid are lower, in the general average, than those of the regular clerical force in the Government Departments. Consequently great difficulty is found in filling the vacancies frequently arising from resignations, of which there have been no less than eight during the past six years.

Very respectfully, your obedient servant,

SIMON NEWCOMB,

Professor U. S. Navy, Superintendent Nautical Almanac.

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ANNUAL REPORT OF THE NAVAL INSPECTOR OF ELECTRIC LIGHTING.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,
Washington, October 1, 1891.

SIR: During the past year the installation of electric lights on board of the U. S. Receiving Ship *Vermont* was completed and the electric plants on board the U. S. S. *Boston* and *Dolphin* received extensive repairs, that on the latter vessel being almost entirely renewed, the situation of the dynamo room being changed with good results. The electric plants on board the U. S. S. *Newark*, *Concord*, *Bennington*, and *Miantonomoh* have not been completed according to the specifications, although all but the latter vessel are in commission. In the case of the *Newark*, the Thomson-Houston Electric Company having the contract for the installation, the generating sets have not met the specifications in that the dynamos are not properly compounded, and the heating limit allowed has been largely exceeded, and no search lights have been furnished; it is hoped, however, that these defects and deficiencies will, before long, be made good. In the case of the *Concord* and *Bennington* the generating sets have, after repeated trials, failed to pass a satisfactory test, and are to be replaced by others of a different type as soon as the contractors, the Edison General Electric Company, can manufacture the same. With the exceptions noted the rest of the installations on these vessels have been completed in accordance with the Bureau's requirements. The Brush Electric Company, the contractors for the *Miantonomoh*, have not completed the electric plant of this vessel, the failure being with the dynamos. Early in the summer one generating set of 200 amperes of the Thomson-Houston manufacture was installed and the wiring of the vessel practically completed. At the request of the contractors the Department consented to change the capacity of the second generating set from that of 400 amperes, called for by the specifications, to one of 200 amperes, which, however, at this date has not been installed.

The coast-defense vessel *Monterey* is receiving an electric plant, which is being installed by the contractors of the vessel.

Specifications have been prepared for electric lighting plants on board the *New York*, Cruisers Nos. 9, 10, and 11, Gunboats Nos. 5 and 6, Harbor-Defense Ram, Practice Cruiser, and Torpedo Boat No. 2. These vessels, with the exception of the latter, are well advanced in their construction, and the work of the installation should begin at an early date, the contract for Cruisers Nos. 9 and 10 having already been awarded by the contractor to the Edison General Electric Company.

As the U. S. S. *Maine*, *Texas*, *Raleigh*, and *Cincinnati* are being built by the Government at its navy-yards their electric plants will be installed by Government labor. Contracts for the greater portion of the material required have been made, and it is expected that the work of installation on board of these vessels will commence this year.

Specifications for Cruisers Nos. 12 and 13 and the battle-ships *Massachusetts*, *Indiana*, and *Oregon* are being prepared.

As soon as the construction work on the monitors *Puritan*, *Amphitrite*, *Monadnock*, and *Terror* will permit, the work of placing in these vessels suitable electric plants will be commenced. A portion of the material required for these vessels will soon be available.

The multipolar dynamo of Edison design, hertofore supplied by that company, has not given upon trial the satisfaction expected or merited

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the favorable opinion originally entertained. Recognizing its unsuitability for naval work, the Edison General Electric Company have recently brought out a new design, and are now under contract to supply a number of generating sets. In designing these sets economy of space and weight have been considered, the armatures being mounted upon the engine shaft, thus dispensing with all couplings and reducing the number of bearings. The external field will be minimized, and the whole set will be of much simpler design than any set supplied in this country for naval purposes.

With a view to securing greater efficiency it is intended that the lighting system on board of the new vessels shall be divided into three parts; first, night circuits, where artificial light is only needed through the night; second, day circuits, where artificial light is needed at all times; and third, battle circuits, which include the necessary lights for working the vessel during action; these circuits to be controlled from the dynamo room.

As the plants on the vessels lighted by electricity have been installed by different companies, the material being the output of different manufacturers, there is a want of interchangeability in the fittings, and to a great degree each vessel is independent of others, particularly in regard to stores, thus requiring a great variety of supplies of the same article to be kept. Steps have been taken to correct this by the adoption of a standard naval holder for incandescent lamps, which will in time allow the same lamp being used on all vessels. The great variety of light fixtures have been reduced one-half and the parts made interchangeable by the adoption of standard electric-light fixtures. By the utilizing of lamps on board ship to light contiguous spaces the number of lights required has been reduced.

SEARCH LIGHT.

A contract for a number of these projectors having been made with the Thomson-Houston Electric Company, it is expected that in fulfilling the same the Government will receive a superior article, with a power equal to any that are afloat.

Search lights are of value not only for war and navigation purposes but can be utilized for signaling, and, in cases of emergency, such as the upsetting of a boat, man overboard, etc., they will be found of great assistance; for, if the crew are trained in their use, a quartermaster, signalman, or other person in the vicinity of the light could turn its rays in the direction of and illuminate the scene; this act would inspire hope and courage, besides materially aiding in the relief and rescue of the unfortunates.

SIGNALING.

The vessels on the north Atlantic station and in the Squadron of Evolution have been equipped with the Ardois system of electric night signals, and it is expected that after extended use with this system, which is regarded with much favor abroad, some system of signaling will be devised that will satisfy the needs of the service.

INTERIOR MEANS OF COMMUNICATION.

The demand for reliable telegraphs for transmitting orders from the controlling stations to the main and steering engines, and for efficient indicators showing directly the number of revolutions of the propellers,

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and the angle of the rudder, is still unanswered. As several parties have undertaken to meet this requirement, it is to be hoped that before long vessels can be provided with the necessary instruments which will greatly facilitate the handling of ships during squadron maneuvers.

Heretofore mechanical telegraphs between the controlling stations and the engine have been employed with good results, but when the structural features of the new vessels are considered, it will be found that mechanical connections, where long leads and many turns are encountered, will be difficult to run and operate; this will be emphasized when additional connections are made with the system. In modern vessels there will be two controlling stations, one on the bridge for ordinary use, and one in the conning tower for action; it is also deemed by some necessary to have means for controlling the vessel from other points, such as the pilot-house and some suitable location aft; and unless independent means be supplied for each station, connection must be made with the main telegraph—that from the bridge to the engine room. Where independent means are given to each station, the result will be the multiplication of parts with the attendant increase of weight and absorption of space.

The purely mechanical methods only communicate certain conditions, such as, "stop"—"stand by"—"slow"—"half speed"—"full"—and not the number of revolutions, a necessity in maneuvering.

It is considered very desirable to know in return the actual speed being made by the engine, and that without human aid; hence the necessity for direct reading indicators that will show the direction and speed of a propeller at a glance. The same reasoning is applicable to the control of the rudder.

If the same efficiency can be obtained with different systems, then the one most easily worked, requiring less space and less weight, due regard being had to original price and cost of maintenance, should be preferred.

The experimental telephone circuits introduced by the American Bell Telephone Company, on board the *Philadelphia*, have given satisfaction, particularly the one not exposed, and it is thought that the difficulties in the case of the exposed circuit are such as to be easily corrected.

Voice pipes, where exposed, have been made more serviceable by the attachment of the mouth pieces to short lengths of flexible tubing that is kept attached to the fixed tube, and for use is drawn out, enabling the mouthpiece to be brought into close proximity to the mouth or ear; this plan permitting use of the eyes at the time of receiving or transmitting a message, and doing away with the necessity of stooping, has contributed towards the efficiency of these pipes; still the space occupied, their weight, the difficulties of installation with the number of unavoidable bends and turns, impair to a great extent their value.

The recommendations contained in the last report I beg to renew, believing that the experience of the past year has but strengthened the demands, viz, that the rate of electrical machinist be established, the pay to be such as will attract and compensate suitable persons, the rating to be opened to any enlisted man possessing the necessary qualifications; and also that the services of a draftsman be secured. While the work of standardizing the different parts connected with the electrical plant of a vessel is going on, and to meet the constant demands of manufacturers and contractors for drawings of standard articles, the services of a draftsman should be available without depending upon the courtesy of other Bureaus.

I feel it to be not only a duty but a pleasure to express my apprecia-

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tion of the services rendered by the officers engaged upon this special work, and to bring to your notice the ability, commendable zeal, and cheerfulness displayed by Lieuts. Wainwright Kellogg, Lucien Flynne, Hamilton Hutchins, and Lieut. (J. G.) A. W. Grant; Ensigns E. F. Leiper, J. J. Blandin, H. A. Field, and J. W. Oman, in the performance of their duties. To Ensign Blandin, an officer of marked ability, energy, and good judgment, I am especially indebted for aid in the preparation of specifications and the performance of duties connected with the office.

Respectfully submitted.

J. S. NEWELL,
Commander U. S. Navy, Naval Inspector Electric Lighting.

The CHIEF OF THE BUREAU OF EQUIPMENT.

Schedule of bids for installing electric light plant on board U. S. S. Lancaster, under advertisement dated August 8, 1890.

Thomson-Houston Electric Company $15,500.00
Rejected on account of being in excess of appropriation.

Schedule of bids for making ten compensating binnacles, under advertisement dated August 12, 1891.

John Bliss & Co	$194.00
E. S. Ritchie & Sons *	160.00
Robert Merrill's Sons	245.30
Riggs & Bro	197.50

Schedule of bids for installing electric light plant on board U. S. S. Lancaster, under advertisement dated August 27, 1891.

Edison General Electric Company $18,964.00
No award.

Schedule of bids for making twelve compensating binnacles, under advertisement dated May 18, 1891.

E. S. Ritchie & Sons *	$145.00
Robert Merrill's Sons	225.00

Schedule of bids for repairing and remounting instruments at New Naval Observatory, under advertisement dated May 15, 1891.

Name of bidder.	Great equatorial.	Meridian circle.	Transit instrument.	Prime vertical instrument.
Geo. N. Saegmuller*		$6,140.00	$595.00	$2,490.00
Warner & Swasey	$32,400.00			
Alvan Clark & Sons *	28,700.00			

* Awarded.

Schedule of bids for twelve electric generating sets, under advertisement dated May 1, 1891.

	Class A.	Class B.	Class C.
Edison General Electric Company	*$70,000.00	$41,669.20	$8,160.00
Thomson-Houston Electric Company	88,650.00	*39,949.00	*7,600.00

* Awarded.

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Statement of sale, under competition, of condemned equipment articles at the Naval Observatory on February 9, 1891, showing the articles sold, the parties buying the same, and the amount realized therefrom.

Articles.	By whom purchased.	Amount.
132 chronometers	John Bliss & Co	$2,839.00
65 sextants	do	204.00
60 octants	Charles C. Hutchinson	300.00
20 watches	Fauth & Co	60.00
		2,903.00
Bills for advertising		63.23
Deposited in U. S. Treasury.		2,839.77

ANNUAL REPORT OF SUPERINTENDENT OF COMPASSES.

NAVY DEPARTMENT,
BUREAU OF EQUIPMENT,
Compass Office, August 11, 1891.

SIR: I have the honor to submit the following report of the work of this office during the past year:

The list of instruments repaired comprises 50 7½-inch compasses, 70 boat compasses, and 6 azimuth circles. The old and imperishable material was utilized in these instruments and the vital parts made to conform to the latest standard types, resulting in instruments equal in all respects to new.

The following new instruments were purchased, viz, 30 boat compasses, 10 azimuth circles, 11 compensating binnacles, 12 horizontal vibration instruments, 6 vertical vibration instruments, and 6 heeling adjusting instruments. Of these items the azimuth circles are of a new type, differing materially from those formerly issued to the service, besides being more efficient and cheaper. The compensating binnacles are of the office pattern referred to in my previous report, one of which is of a special size and is mounted on the *Cushing*. Six of the twelve horizontal vibration instruments were purchased in England, the remainder, together with the other magnetic instruments, of Messrs. Queen & Co., Philadelphia.

Miscellaneous articles purchased comprise 42 small cylindrical magnets, 11 heeling correcting magnets, for use in compensating binnacles and for correction of compasses in the ordinary type of binnacle; 600 copies of charts of the earth's magnetic horizontal force and dip (300 of each), 1,000 dygogram forms, and 1,000 Napier's diagrams. The charts of the earth's forces were reproduced, by permission, from the "Report on the magnetical results of H. M. S. *Challenger*."

The New York navy-yard furnished ten cast-iron spheres of a smaller diameter than those accompanying the binnacles, and material, consisting of wrought-iron rods and tubes for the Flinder's correction of the compass on several ships.

The Government Printing Office supplied 300 copies of Circular No. 45, "Directions for the use of the Compensating Binnacle," referred to in my report of last year, and since issued to the service, also 1,000 copies each of Forms I, III, and IV, Compass Reports.

The material for the Flinder's correction of the *Newark's* compasses was purchased from the shipbuilders, Messrs. Cramp & Sons, together with stands for mounting the Pelorus.

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In the purchase of new instruments and the repairs of unserviceable ones, in the past year, there has been effected a saving of $7,400 over former prices, due to changes in the types of compensating binnacles and azimuth circles, and to the utilization of good material in the unserviceable instruments in store.

The compensating binnacle has been somewhat modified to meet the demands of the service, and it is believed that no essential changes will be necessary in future, and that the latest type will be equal to all reasonable requirements of compensation.

Drawings and specifications of this instrument were made in the office, and bids invited by the Bureau for the manufacture of twelve, the contract for which has been awarded to Messrs. E. S. Ritchie & Sons, Brookline, Mass.

The bubble clinometer for indicating the heel of the ship, issued to the service during the last few years, has not given entire satisfaction, and has been replaced by another form designed by Passed Assistant Engineer Webster, U. S. Navy. This instrument had been in use on several ships prior to its consideration by this office, and had been favorably reported upon.

The heeling error of the compass on the new cruisers has been heretofore corrected by the use of the Thomson vertical force instrument, which accomplished the end in a practical and mechanical way without the need of ascertaining the value of the vertical force acting on the compass. As the question of a thorough knowledge of all the magnetic elements of an iron or steel ship is important, it has been considered advisable to supplement the Thomson instrument by one which would enable the navigator to determine the value of the vertical magnetic force at the position of each compass on board, to accomplish which the office has devised a vertical vibration instrument. This instrument is a modification of the dip circle, and will form a part of the outfit of magnetic instruments issued to the steel vessels of the service.

The inspection of magnets for binnacles, individual parts of compasses, and azimuth circles under construction has been carried on as usual, and the records of such inspection carefully kept for reference. It may be said in this connection that this feature of the office work results in obtaining instruments for the service that are not surpassed in accuracy or precision in any other country.

Compass reports have been received from vessels in commission in compliance with Bureau instructions, with commendable regularity and frequency. In addition a large amount of magnetic data not required by explicit instructions has been received, and in all cases verified, corrected, and discussed for the information of the navigator. It is important that these results should reach every officer in the service, to do which they should be collated and issued in book form.

The navigators of all the new cruisers that have been commissioned during the year, together with several others anticipating assignment to duty as navigators, have been instructed in the magnetism of ships and in practical compensation of the compass. The results of this practical course have accrued to the benefit of the service, and besides have, in a considerable degree, lightened the outside work of the office in the installation of compasses on board the recently commissioned ships.

I would suggest, however, that the course of the Department in ordering one officer at a time for compass instruction be changed, and that officers available for such duty be sent in classes limited to six in number—the desk capacity of the office—and that they be ordered at stated intervals to be determined by the superintendent of compasses,

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dependent upon the immediate importance of the work on hand and required of the office.

My reasons for this suggestion are that the compass course has aroused considerable interest in the service, and a number of officers desire to take advantage of it. The period of instruction embraces not more than two weeks, during which the instructor must devote his entire attention to the work. Larger classes will result in spreading practical information among a greater number, and fewer intervals of instruction during the year will prevent the current work of the office from falling in arrears.

During the year compasses were placed and compensated on the *Philadelphia*, *San Francisco*, *Newark*, *Concord*, *Vesuvius*, and *Cushing*. Observations to determine the best locations, magnetically, for the compasses on board these vessels, and to facilitate their compensation, were made by the officers attached to this office or by directions given to the navigators.

In some instances changes in construction were necessary. On the *Newark* the upper steam steering wheel was removed from the forward bridge to the top of the pilot house. In its former position the compass was located over the steel conning tower, the magnetic field emanating from which being so strong as to render compensation ineffective and the compass unreliable. In the new position the errors of the compass have been easily and accurately corrected.

The pilot houses of the *Concord* and *Bennington* were enlarged over the original plans, to allow more room for the steering compass and to increase the distance of the latter from the conning tower. Observations taken in the position of this compass on the *Concord* developed the existence of a force produced by the tower equal to 1.5 times that of the earth. The introduction of 6 wrought-iron rods, placed vertically forward of the compass, had the effect of reducing this force within practical limits of compensation. A similar disposition of rods was made on the *Bennington*, whose compass conditions are identical with those of the *Concord*.

An unfortunate feature on board these two vessels, from a compass point of view, exists in the present plan of securing the search lights amidships on top the pilot-house. The pedestals of the lights are iron, and when secured for sea are uncomfortably near the check compass, necessitating the use of two deviation tables, one when the lights are moved to the ends of the bridge and another when secured amidships. Fixed local iron near the compass is bad enough; movable iron complicates the problem, and every means should be taken to guard against it.

In January last the office submitted a list of compass questions, with a request that they should form a part of the inspection report of vessels in commission. They have since been adopted and are included in that report, and it is expected that valuable information will be gained therefrom concerning the changes in a vessel's magnetism due to firing guns, retentive magnetism, influence of dynamo, change of latitude, etc., a knowledge of which will readily suggest its value to the navigators.

Numerous experiments have been made during the year to facilitate compensation, and certain valuable results have been reached and issued to the navigators of the new cruisers for their information.

The Florian method of quadrantal correction by means of a magnet, referred to in my last report, has been extensively experimented upon by the office, and the conclusions arrived at demonstrate its adaptability to certain cases that may arise in some of the future ships. It is held in reserve for use as occasion may require.

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The compass difficulties in some of the vessels now building are beginning to assume serious proportions. This is especially true of the battle-ships and other vessels whose pilot houses are located on top of conning towers. It is not possible to predict results with any degree of certainty, but based upon observations taken in the midst of surroundings of a similar nature it may safely be assumed that compensation will be a matter of considerable difficulty, and the compass of doubtful utility, if not wholly unreliable.

The office has suggested such means for improving the surroundings of the compass as the conditions of construction on these vessels would allow. The margin left to work upon, however, has in some cases been very limited, and the results are not encouraging.

A compass placed immediately over so large a mass of iron as a conning tower lies in the midst of a strong, local, magnetic field. The armored tube leading vertically from the tower to the protective deck and directly over the dynamo, in addition to the induced magnetism it naturally receives from the earth, becomes still further magnetized when the dynamo is in operation. This additional magnetic charge is communicated to the tower above, and results in the problem of a compass struggling in the midst of an original field much stronger than the earth's directing magnetism, with the certainty of an increased and variable disturbance when the dynamo is running.

The difficulty that lies in such conditions must appeal to the mind of every navigator, and their avoidance can not be too strongly recommended to the designers of the vessels. In the distribution of the local iron masses the importance of the compass can not be ignored, for upon its efficiency depends the safety of the vessel.

The office is gratified to report that the compasses on board all the steel vessels in commission to date have been corrected within small limits of error. In some of the later ships the original conditions were undoubtedly severe, but a few changes in construction and a judicious disposition of iron rods in some cases have reduced the original magnetism to moderate proportions.

Nevertheless, it must be remembered that compensation has its limits, as it is but the application of equal and opposite forces in the shape of magnets, iron spheres, and rods, whose office is to counteract the original disturbance. The forces that emanate from the local masses in the immediate vicinity of the compass are the most troublesome feature of the problem, and with increasing severity of conditions it is not unreasonable to expect that the resources of compensation may eventually be exhausted.

Lieut. J. C. Gillmore reported for duty July 17, 1890, and has rendered valuable services during the year. Ensign John Gibson was detached on March 12, 1891, since which time the force of the office has consisted of Lieut. Gillmore and myself.

In view of the steadily increasing duties of the office, the accumulation of valuable and unpublished magnetic results from vessels in commission, and the constant requests from the service for practical information regarding the compass, it is considered important that the office force should be increased. It is therefore recommended, for the best interests of the service, that one additional officer and one permanent clerk (nautical expert) be assigned to this duty.

Very respectfully,

S. W. B. DIEHL,
Lieutenant, U. S. Navy, Superintendent of Compasses

The CHIEF OF BUREAU OF EQUIPMENT.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Equipment, Navy Department.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES.			
One chief clerk (appropriated March 3, 1891; R. S. 25, p. 70, sec. 416, pamphlet edition, p. 30.)	$1,800.00		
One clerk of class two (same acts)	1,400.00		
One clerk of class one (same acts)	1,200.00		
Two copyists, at $900 each (same acts)	1,800.00		
One assistant messenger (same acts)	720.00		
One laborer (same acts)	660.00		
		$7,580.00	$7,580.00
CONTINGENT.			
For freight and transportation of equipment stores, packing boxes and materials, printing, advertising, telegraphing, books and models; postage on letters sent abroad; ferriage, ice, lighterage of ashes, and emergencies arising under the Bureau of Equipment unforeseen and impossible to classify. (Appropriated March 2, 1891, pamphlet edition, p. 16)		15,000.00	15,000.00
INCREASE OF THE NAVY.			
Toward the completion of the equipment outfit of the new vessels heretofore authorized by Congress. (Appropriated March 2, 1891, pamphlet edition, p. 7)		600,000.00	400,000.00
EQUIPMENT OF VESSELS.			
For purchase of coal for steamers and ships' use, including expenses of transportation, storage, and handling the same; hemp, wire, iron, and other materials for the manufacture of cordage, anchors, galleys, and chain cables; canvas for the manufacture of sails, awnings, hammocks, and other canvas work; water for steam launches; stationery for commanding and navigating officers of ships, equipment officers on shore and afloat, and for the use of courts-martial on board ship; foreign and local pilotage and towage of ships of war; services and materials in repairing, correcting, adjusting, and testing compasses on shore and on board ship; nautical and astronomical instruments and repairs to same; libraries for ships of war; professional books and papers; naval signals and apparatus, namely, signal lights, lanterns, and rockets; running lights, compass fittings, including binnacles, tripods, and other appendages of ship's compasses; logs and other appliances for measuring ship's way and leads and other appliances for sounding; lanterns and lamps and their appendages for general use on board ship for illuminating purposes, and oil and candles used in connection therewith; bunting and other materials for making and repairing flags of all kinds; photographic instruments and materials; musical instruments and music; installing and maintaining electric-light plants, and means of interior signal communications on board vessels of war; and for the purchase of all other articles of equipment at home and abroad, and for the payment of labor in equipping vessels and manufacture of equipment articles in the several navy-yards. Appropriated March 2, 1891, pamphlet edition, pp. 14, 15		1,000,000.00	960,000.00
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth N. H.:			
One clerk (appropriated March 2, 1890; pamphlet edition, p. 15)	1,200.00		
One clerk (same act; pamphlet edition, p. 15)	1,000.00		
Navy-yard, Boston, Mass.:			
One superintendent of ropewalk (same act; pamphlet edition, p. 15)	1,875.00		
One clerk (same act; pamphlet edition, p. 15)	1,400.00		
One clerk (same act; pamphlet edition, p. 15)	1,300.00		
One writer (same act; pamphlet edition, p. 15)	950.00		

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Estimates of appropriations required, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
CIVIL ESTABLISHMENT—continued.			
Navy-yard, New York:			
One clerk (same act; pamphlet edition, p. 15)	$1,400.00		
One clerk (same act; pamphlet edition, p. 15)	1,200.00		
One writer (same act; pamphlet edition, p. 15)	1,000.00		
One storekeeper (same act; pamphlet edition, p. 15)	900.00		
Navy-yard, League Island, Pa.:			
One clerk (same act; pamphlet edition, p. 15)	1,200.00		
Navy-yard, Norfolk, Va.:			
Two clerks at $1,200 each (same act; pamphlet edition, p. 15)	2,400.00		
Navy-yard, Mare Island, Cal.:			
One clerk (increase of $200 submitted) * (same act; pamphlet edition, p. 15)	1,400.00		
One clerk (same act; pamphlet edition, p. 15)	1,000.00		
Navy-yard, Washington:			
One clerk (same act; pamphlet edition, p. 15)	1,000.00	$19,225.00	$19,025.00

* The increase of $200 in the pay of this clerk is herewith submitted in order to place him on equality with other clerks in the yard filling similar positions and whose duties are not more arduous, or require greater intelligence.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the New Naval Observatory.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
APPROACHES AND GROUNDS.			
Observatory lane: Grading, filling, building culvert and retaining wall, and laying road-bed from Tenallytown road to New Naval Observatory (submitted)	$4,962.67		
Approach from Rock Creek: Improving grade and road-bed (submitted)	1,863.00		
Asphalting road and footways (submitted)	2,500.00		
Material and labor to fill in ravine contiguous to boiler-house (submitted)	2,500.00	$11,825.67	
NEW MERIDIAN CIRCLE.			
One 6-inch meridian circle, with mounting, collimators, reflection apparatus, reversing carriage, personal equation apparatus, illumination and all accessories, complete (submitted)	10,000.00	10,000.00	
NOTE.—The new meridian circle is needed for the exact determination of the positions and motions of the fundamental stars, the foundation of all our knowledge of the structure of the universe. The labor and expense involved in the reduction of observations of this kind necessarily throw this work upon a limited number of large Government observatories. Only two other nations—Great Britain and Russia—have systematically kept up this work for a long period of years. The large transit circle which was mounted at the Naval Observatory in 1865 has proved to be only suited for differential work, and a new and modern instrument is needed for fundamental work, particularly since the position of our Observatory, so much farther to the south than those of Europe, gives us special facilities for extending the fundamental system of the northern sky well to the southward of the equator, where so little work of this character has been done. The west meridian circle room of the new Observatory was originally designed for this instrument.			

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Estimates of appropriations required, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
NEW BUILDINGS.			
Three dwellings for observers, at $10,000 each (submitted)..	$30,000.00		
Repair shop and storehouses for instruments (submitted) ..	4,000.00		
		$34,000.00	
NOTE.—*Dwelling for observers.*—In order that the work of a large observatory may be properly and economically done, it is absolutely necessary that the observers be within prompt call to their instruments throughout day and night. Very important observations can often be secured from the clearing of the sky for a few hours, or even in some cases for a few minutes, if the observer be within easy call of the watchman. This can only be accomplished, in the isolated situation of the new Observatory, by having dwellings upon the grounds for the observers. The Government erects dwellings at all its navy-yards, arsenals, forts, and schools for the officers on duty there. But no service requires such unremitting attention and constant presence at all hours as that of the astronomer, and no observatory can be regarded as economically managed which does not furnish dwellings for all its observers close by their instruments. It is estimated that with the observers living on the grounds of the new Observatory, not only will two or three times as much work be done as it will be possible to do otherwise, but the quality of this delicate work will be materially improved on account of the observers being in proper physical condition to begin their labors, instead of with nerves unstrung from hurrying some miles from their homes immediately after meals or at unreasonable hours of the night.			
Repair shop and storehouses.—The old Observatory has a storehouse for instruments, and also a repair shop, but no provision has been made for either at the new Observatory. The basement of the main building has been so constructed that it can not be used for either of these purposes, and separate buildings must be constructed for storing the large number of delicate instruments belonging to the Navy and to the Observatory, and for repairing the same.			
REMOVING MAGNETIC OBSERVATORY.			
Removal of magnetic buildings and instruments from the old to the new Observatory, and construction of new basements (submitted).....	8,500.00		
		59,325.67	$136,689.00

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Nautical Almanac Office.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES.			
Salaries of assistants in preparing for publication the American Ephemeris and Nautical Almanac, viz:			
Three assistants, at $1,600 each (act August 5, 1882, vol. 22, p. 245, sec. 1; act March 2, 1891, vol. 26, p. 935, sec. 1) .	$4,800.00		
Two assistants, at $1,400 each (same acts)	2,800.00		
Three assistants, at $1,200 each (same acts).....	3,600.00		
Two assistants, at $1,000 each (same acts)	2,000.00		
One copyist and typewriter (same acts).....	900.00		
One assistant messenger (same acts)	720.00		
One laborer (same acts)	660.00		
Pay of computers on piece-work in preparing for publication the American Ephemeris and Nautical Almanac, and in improving the tables of the planets.....	9,900.00		
		$25,380.00	$25,380.00
RENT AND FUEL.			
For rent and fuel for Nautical Almanac Office.....	1,000.00	1,000.00	1,000.00

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REPORT

OF

THE CHIEF OF THE BUREAU OF NAVIGATION.

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
Washington, D. C., October 22, 1891.

SIR: I have the honor to submit herewith a report (marked A) of the movements of the ships of the Navy, and the duties performed by them during the past year, and copies of the reports of the Superintendent of the Naval Academy (marked B), and of the Hydrographer to the Bureau of Navigation (marked C).

Estimates for the support of the Bureau, the Naval Academy, and the Hydrographic Office for the fiscal year ending June 30, 1892, are also submitted (marked D).

During the year the *Newark*, *Concord*, *Lancaster*, *Marion*, and *Bennington* have been commissioned as cruisers, and the *Monongahela* as a training ship for apprentices. The *Enterprise* has been withdrawn from service as a cruiser, and is now used as a training and practice ship for naval cadets.

The *Swatara*, *Omaha*, *Dolphin*, and *Ranger* have been put out of commission. The *Despatch* and the tug *Triana* have been wrecked.

There being no ship of the Navy on the Pacific station that could be spared from other duties for the purpose, the *Albatross* was borrowed from the Fish Commission to run the line of soundings and make the examination necessary to determine the practicability of laying a telegraph cable between San Francisco and Honolulu, as provided in the act making appropriations for the naval service for the current fiscal year.

This vessel was refitted for the work upon her return from Bering Sea, and sailed from San Francisco October 6.

The usual routine of duties and instruction have been carried on at the Naval Academy, the gunnery schools, and the training station. Every effort has been made by the Hydrographic Office to collect information and furnish it to ships.

After a careful consideration of the various plans submitted for the War College building on Coaster Harbor Island, the contract has been awarded and the work of construction begun, the contract requiring the completion of the building by September 1, 1892.

Your attention is invited to the large number of candidates for admission to the Naval Academy that fail to pass the required mental ex-

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amination. It is believed that this is chiefly due to want of proper instruction and of time for preparation. It is therefore recommended that section 1514 of the Revised Statutes be so amended that appointments to the Academy shall be made one year in advance of the time of admission, as is now provided in section 1317 for appointments to the Military Academy.

Further changes in existing statutes relating to the Naval Academy, so as to conform to the laws governing the Military Academy, are recommended as follows:

That section 1519 be amended to read: No naval cadet found deficient at any examination in either conduct or studies, and recommended to be discharged from the Academy, shall, unless upon recommendation of the Academic Board, be retained or reappointed, or appointed to any place in the Navy before his class shall have finally graduated and received their commissions. (See section 1325.)

That the oath prescribed by section 1320 for cadets entering the Military Academy shall be taken by cadets entering the Naval Academy, substituting the word "Navy" for "Armies" where it occurs.

That naval cadets shall be subject at all times to do duty in such places and in such service as the President may direct. (See section 1323.)

That the Superintendent of the Naval Academy shall have power to convene courts-martial for the trial of naval cadets, and to execute the sentences of such courts, except the sentences of suspension and dismissal. (See section 1326.)

The act of August 5, 1882, should be so amended that the selection for the several corps specified shall be made upon the completion of the four years' course, and that all surplus graduates shall be then discharged. The two years' cruise is a waste of time for young men who will not receive commissions in the Navy, and involves unnecessary expense to the Government.

The act of March 2, 1889, should be so amended that the age for admission shall be between 14 and 18.

The records of the Academy show that the percentage of successful mental examinations of candidates was highest between the ages of 14 and 17.

During the fiscal year ending June 30, 1891, 4,640 men and 694 apprentices were enlisted in the Navy. Of this number 2,022 men were enlisted or reënlisted on board of cruising ships; 2,618 men and the 694 apprentices were enlisted on board of receiving ships in ports where we have naval stations.

During the months of March, April, and May it became necessary to suspend the enlistment of men and apprentices, the quota allowed by law being full.

One thousand and forty men and 1,113 boys, candidates for enlistment on board of the receiving ships, were rejected for physical disqualifications. Three thousand six hundred and thirty-one men and 330 apprentices were discharged. One hundred and thirty-one men and 3 apprentices deserted in foreign ports, and 938 men and 316 apprentices in home ports.

The number of men serving under continuous-service certificates at the end of the year was 1,397.

As an incentive to faithful and continuous service on the part of enlisted men, the Bureau recently issued an order directing that the crews of the receiving and stationary ships shall in future be composed, as far

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as practicable, of persons who have served twenty years as enlisted men in the general service, and that preference shall be given to those who have served under continuous-service certificates.

Already a number of applications under this order have been received, the first being from a meritorious and faithful petty officer with thirty-two years of continuous service.

It is believed that as soon as it is understood that faithful service on the part of the enlisted men is to be rewarded by duty near their homes and families, the better class of men will remain in the service. A great advantage will be gained also by having on all the receiving ships crews of highly trained men, whose knowledge and example will be of great assistance in training recruits.

Heretofore the greater part of the crews of receiving ships has been composed of persons who are not willing to undergo the hardships of sea service.

The following is a careful estimate of the number of enlisted men and apprentices required to man the ships of the Navy:

For the new ships already completed	3,256
For ships ordered and under construction	5,920
For receiving and stationary ships, Naval Academy, etc	902
For practice and training ships	485
For the Coast Survey	325
For the Fish Commission	124
	11,012
For wood and iron ships still available	2,734
Total	13,746

Under the system of enlistments for three years a portion of the force allowed is not available for manning the fleet; it is therefore recommended that the number of men of all ratings allowed for the Navy, including apprentices and boys, be increased to 10,000 and that the term of enlistment for general service be extended by law to four years.

The recommendation made in the last annual report, that men who have honorably served in the United States Navy should be granted, by statute, similar privileges as to citizenship to those provided for the Army, in section 2166 of the Revised Statutes, is renewed.

There being no longer any of the old ships available for use as barracks at the training station at Newport, there are now no facilities at the station for berthing the apprentices except a small building which was intended as a drill room and gymnasium,and is quite unsuitable for a dormitory; while the mess room and kitchen are inconveniently placed nearly a quarter of a mile distant, and are inadequate in point of space and conveniences.

For the success of the training system the time has arrived when it is absolutely necessary that barracks should be built for the apprentices, to contain in one building or group of buildings mess and formation hall, dormitories, wash and drying rooms, and other necessary offices.

The nature of the duties pertaining to this Bureau, including, as they do, supervision of the various schools for the instruction of officers and men and the control and records of the entire personnel of the Navy, makes it necessary to employ naval officers, with their professional knowledge and experience, in charge of the various divisions.

For the same reason it is most important that the person who is to act in the absence of the Chief of Bureau should be an officer of the

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line of the Navy. It is therefore again recommended that the detail of an assistant to the Bureau be authorized by law.

The amount of labor devolving upon the Bureau in the matter of records, and the constant call upon it for information by other departments, renders an increase in the clerical force imperatively necessary in order to keep up the current work.

Very respectfully,

F. M. RAMSAY,
Chief of Bureau.

The SECRETARY OF THE NAVY.

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A.

DETAILED STATEMENT OF MOVEMENTS OF VESSELS IN COMMISSION FOR SEA SERVICE.

NORTH ATLANTIC SQUADRON.

Rear-Admiral BANCROFT GHERARDI, U. S. N., *Commander-in-Chief.*

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Philadelphia, U. S. flag-ship. Capt. FREDERICK RODGERS, U. S. N., commanding.			
Tompkinsville, S. I.	.....	Oct. 30, 1890	At Tompkinsville, last report.
Do.	Nov. 1, 1890	Nov. 16, 1890	
Navy-yard, New York	Nov. 16, 1890	Nov. 23, 1890	
West Twenty-seventh street, New York.	Nov. 23, 1890	Dec. 7, 1890	
Navy-yard, New York	Dec. 7, 1890	Jan. 13, 1891	
Stapleton, S. I	Jan. 13, 1891	Jan. 19, 1891	
Arcadins Island, Haiti	Jan. 24, 1891	Jan. 25, 1891	
Port-au-Prince, Haiti	Jan. 25, 1891	Feb. 27, 1891	
Gonaives, Haiti	Feb. 27, 1891	Mar. 10, 1891	
Port-au-Prince, Haiti	Mar. 10, 1891	Mar. 14, 1891	
Kingston, Jamaica	Mar. 15, 1891	Mar. 28, 1891	
Port-au-Prince, Haiti	Mar. 29, 1891	Apr. 27, 1891	
Samana Bay, San Domingo	Apr. 29, 1891	May 6, 1891	
St. Thomas, W. I.	May 7, 1891	May 11, 1891	
Tompkinsville, S. I	May 16, 1891	May 17, 1891	
Navy-yard, New York	May 17. 1891	June 28, 1891	
Tompkinsville, S. I	June 28, 1891	June 30, 1891	
New London, Conn	June 30, 1891	July 21, 1891	
Halifax, Nova Scotia	July 23, 1891	July 30, 1891	
Bar Harbor, Me	July 31, 1891	Aug. 26, 1891	
New London, Conn	Aug. 28, 1891	Sept. 15, 1891	
New York, N. Y	Sept. 16, 1891	Sept. 17, 1891	
Navy-yard, New York	Sept. 17, 1891	.....	
Kearsarge. Commander HORACE ELMER, U. S. N., commanding.			
Key West, Fla	.....	Dec. 13, 1890	At Key West, Fla., last report.
Port Royal, S. C	Dec. 17, 1890	Dec. 24, 1890	
Norfolk, Va	Dec. 31, 1890	Jan. 27, 1891	
Port-au-Prince, Haiti	Feb. 4, 1891	Feb. 14, 1891	
Port Antonio, Jamaica	Feb. 15, 1891	Feb. 22, 1891	
Kingston, Jamaica	Feb. 23, 1891	Feb. 25, 1891	
Port-au-Prince, Haiti	Feb. 27, 1891	Mar. 7, 1891	
Gonaives, Haiti	Mar. 8, 1891	Mar. 9, 1891	
Port-au-Prince, Haiti	Mar. 9, 1891	Mar. 13, 1891	
Gonaives Haiti	Mar. 14, 1891	Mar. 20, 1891	
Santa Barbara, Samana Bay	Mar. 22, 1891	Mar. 24, 1891	
Santo Domingo City	Mar. 26, 1891	Mar. 29, 1891	
Santiago de Cuba	Mar. 31, 1891	Apr. 4, 1891	
Havana, Cuba	Apr. 9, 1891	Apr. 13, 1891	
Key West, Fla	Apr. 14, 1891	Apr. 19, 1891	
Port-au-Prince, Haiti	Apr. 24, 1891	Apr. 28, 1891	
Navassa Island	Apr. 29, 1891	May 2, 1891	Ordered to Navassa Island to make inquiry into the situation of affairs there.
Port Antonio, Jamaica	May 3, 1891	May 7, 1891	
Navassa Island	May 8, 1891	May 15, 1891	
Kingston, Jamaica	May 16, 1891	May 19, 1891	
Navassa Island	May 21, 1891	May 29, 1891	
Kingston, Jamaica	May 30, 1891	June 3, 1891	
Navassa Island	June 4, 1891	June 20, 1891	
Havana, Cuba	June 25, 1891	June 25, 1891	
Key West, Fla	June 26, 1891	June 26, 1891	
Navy-yard, New York	July 2, 1891	July 18, 1891	

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NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Kearsarge—Continued.			
Navy-yard, Portsmouth, N. H	July 20, 1891	Sept. 9, 1891	Ordered to navy-yard, Portsmouth, for repairs.
New London, Conn	Sept. 10, 1891	Sept. 18, 1891	
New York, N. Y	Sept. 25, 1891		
Gardiners Bay	Sept. 18, 1891	Sept. 24, 1891	
Hempstead Bay	Sept. 24, 1891	Sept. 25, 1891	
Enterprise. Commander G. A. CONVERSE, U. S. N., commanding. Relieved July 28, 1891, by Commander G. W. PIGMAN, U. S. N.			
New York, N. Y		Oct. 30, 1890	At New York, last report.
Colon, United States of Colombia	Nov. 12, 1890	Nov. 27, 1890	Protecting American interests in Central America.
Boca del Toro, United States of Colombia.	Nov. 28, 1890	Nov. 29, 1890	
Colon, United States of Colombia	Nov. 30, 1890	Dec. 19, 1890	
Colon, United States of Colombia	Dec. 21, 1890	Feb. 8 1891	
Colon, United States of Colombia	Feb. 15, 1890	Feb. 18, 1891	
Kingston, Jamaica	Feb. 23, 1891	Feb. 27, 1891	
Port Royal, Jamaica	Feb. 27, 1891	do	
Port Antonio, Jamaica	Feb. 28, 1891	Mar. 11, 1891	
Port au Prince, Haiti	Mar. 14, 1891	Apr. 3, 1891	
Kingston, Jamaica	Apr. 5, 1891	Apr. 7, 1891	
Havana, Cuba	Apr. 11, 1891	Apr. 15, 1891	
Key West, Fla	Apr. 16, 1891	Apr. 23, 1891	
Port au Prince, Haiti	Apr. 28, 1891	Apr. 28, 1891	
Santa Barbara	Apr. 30, 1891	May 6, 1891	
St. Thomas	May 7, 1891	May 11, 1891	
Puerta Plata, San Domingo	May 13, 1891	May 15, 1891	Visited Puerta Plata at request of Bureau of American Republics and surveyed ruins of the ancient city of Isabella, founded by Columbus.
New York	May 21, 1891	June 24, 1891	
New London, Conn	June 25, 1891	July 7, 1891	
Gardiners Bay (Long Island), N. Y.	July 7, 1891	do	
New London, Conn	do	July 18, 1891	
Boston, Mass	July 20, 1891	July 21, 1891	
Portsmouth, N. H	July 21, 1891	July 25 1891	
Bar Harbor, Me	July 26, 1891	Aug. 26, 1891	
New London, Conn	Aug. 29, 1891	Sept. 14, 1891	
Annapolis, Md	Sept. 17, 1891		Sept. 9, 1891, detached from North Atlantic station. This vessel is now being used as a cadet training and practice ship at the Naval Academy.
Dolphin. Commander YATES STIRLING, U. S. N., commanding.			
New York, N. Y		Jan. 7, 1891	At New York last report. Dec. 22, 1890, detached from North Atlantic squadron and assigned to Squadron of Evolution.
Newport, R. I	Jan. 7, 1891	Jan. 8, 1891	
Norfolk, Va	Jan. 9, 1891	Jan. 23, 1891	
Fort Monroe, Va	Jan. 23, 1891	Jan. 24, 1891	
Galveston, Tex	Feb. 2, 1891	Feb. 6, 1891	
New Orleans, La	Feb. 9, 1891	Feb. 23, 1891	
Pensacola, Fla	Feb. 24, 1891	Mar. 10, 1891	
Tampa Bay, Fla	Mar. 12, 1891	Mar. 18, 1891	
Pensacola, Fla	Mar. 19, 1891	Mar. 21, 1891	
Tampa Bay, Fla	Mar. 22, 1891	Apr. 2, 1891	
Havana, Cuba	Apr. 4, 1891	Apr. 4, 1891	
Norfolk, Va	Apr. 7, 1891		Put out of commission at the Navy-yard, Norfolk, Va., May 1, 1891.
Petrel. Lieut. Commander W. H. BROWNSON, U. S. N., commanding. Relieved July 19, 1891, by Lieut. Commander M. R. S. MACKENZIE, U. S. N.			
Gardiner's Bay		Oct. 4, 1890	At Gardiner's Bay, last report.
Tompkinsville, Staten Island	Oct. 5, 1890	Nov. 6, 1890	
New York City, North River	Nov. 6, 1890	Nov. 10, 1890	
Off Fort Norfolk, Va	Nov. 11, 1890	Nov. 13, 1890	
Norfolk navy-yard	Nov. 13, 1890	Nov. 25, 1890	
Fort Norfolk, Va	Nov. 25, 1890	Nov. 26, 1890	
Fort Monroe, Va	Nov. 26, 1890	Dec. 9, 1890	
San Juan, Porto Rico	Dec. 15, 1890	Dec. 17, 1890	

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NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Petrel—Continued.			
Road Harbor, Tortola	Dec. 18, 1890	Dec. 20, 1890	
Basse Terre, St. Kitts	Dec. 21, 1890	Dec. 23, 1890	
St. Pierre, Martinique	Dec. 24, 1890	Dec. 26, 1890	
Port Castries, St. Lucia	Dec. 26, 1890	Jan. 2, 1891	
Barbadoes	Jan. 3, 1891	Jan. 7, 1891	
Port au Spain, Trinidad	Jan. 8, 1891	Jan. 17, 1891	
Cape Haitien, Haiti	Jan. 21, 1891	Jan. 22, 1891	
Port au Prince, Haiti	Jan. 23, 1891	Feb. 3, 1891	
Port Antonio, Jamaica	Feb. 4, 1891	Feb. 11, 1891	
Port au Prince, Haiti	Feb. 12, 1891	Feb. 17, 1891	
Kingston, Jamaica	Feb. 18, 1891	Feb. 26, 1891	
Port au Prince, Haiti	Feb. 27, 1891	Mar. 13, 1891	
Greytown	Mar. 17, 1891	Mar. 30, 1891	
Roncador Bank	Apr. 1, 1891	Apr. 1, 1891	
Greytown	Apr. 2, 1891	Apr. 29, 1891	
Tampa Bay, Fla	May 4, 1891	May 5, 1891	
Key West, Fla	May 6, 1891	May 18, 1891	
New York, N. Y., navy-yard	May 24, 1891	June 25, 1891	
Off 26th street, New York	June 25, 1891	June 29, 1891	
New London, Conn	June 29, 1891	July 21, 1891	
Halifax, Nova Scotia	July 23, 1891	July 30, 1891	
Bar Harbor, Me	July 31, 1891	Aug. 26, 1891	
New London, Conn	Aug. 29, 1891	Sept. 10, 1891	Sept. 9, 1891, detached from duty on North Atlantic station.
Navy-yard, New York	Sept. 11, 1891	Nov. 1, 1891	Oct. 21, 1891, ordered to duty on Asiatic station.
Vesuvius. Lieut. SEATON SCHROEDER, U. S. N., commanding.			
New York, N. Y		Apr. 30, 1891	At New York, last report.
Norfolk, Va	May 2, 1891	May 17, 1891	
Fort Monroe, Va	May 17, 1891	May 18, 1891	
Do	May 18, 1891	May 19, 1891	Out for target practice.
Do	May 19, 1891	May 20, 1891	
Do	May 20, 1891	May 21, 1891	
Norfolk, Va	May 21, 1891	June 27, 1891	June 27, 1891, assigned temporarily to Squadron of Evolution.
New London, Conn	June 29, 1891	July 1, 1891	
Boston, Mass	July 2, 1891	July 13, 1891	Took part in the exercises and maneuvers at Boston and New York for the instruction of the organised naval militia.
New York, N. Y	July 15, 1891	July 25, 1891	
Falkner's Island	July 25, 1891	July 26, 1891	
Fisher's Island	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
Hempstead Bay, L. I	Aug. 3, 1891	Aug. 4, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 12, 1891	
Bartlett's Reef	Aug. 13, 1891	Aug. 13, 1891	
New London, Conn	....do	Aug. 14, 1891	
Newport, R. I	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 30, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	
New York, N. Y	Sept. 11, 1891	Sept. 30, 1891	
New London, Conn	Oct. 1, 1891		

SOUTH ATLANTIC SQUADRON.

*Rear-Admiral W. P. MCCANN, U. S. N., *Commander-in-Chief.*

Pensacola, U. S. flagship. Capt. ALBERT KAUTZ, U. S. N., commanding.			
Bahia, Brazil		Oct. 27, 1890	At Bahia, Brazil, last report.
Rio de Janeiro, Brazil	Nov. 1, 1890	Nov. 18, 1890	
Montevideo, Uruguay	Nov. 24, 1890	Dec. 15, 1890	
Maldonado, Uruguay	Dec. 16, 1890	Dec. 23, 1890	
Montevideo, Uruguay	Dec. 23, 1890	Jan. 28, 1891	

*Rear-Admiral W. P. McCann was detached from command of the South Atlantic and South Pacific stations on August 15, 1891.

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SOUTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Pensacola—Continued.			
Sandy Point, Chile	Feb. 6, 1891	Feb. 10, 1891	
Talcahuano, Chile	Feb. 20, 1891	Feb. 24, 1891	
Valparaiso, Chile	Feb. 25, 1891	Mar. 11, 1891	Jan. 24, 1891, Rear-Admiral McCann was ordered to proceed with the Pensacola to Valparaiso and assume command of South Pacific station.
Iquique, Chile	Mar. 17, 1891	Mar. 21, 1891	In Chilean waters protecting American interests.
Pisagua, Chile	Mar. 21, 1891	...do	
Antofagasta, Chile	Mar. 23, 1891	Mar. 23, 1891	
Caldera, Chile	Mar. 24, 1891	Mar. 26, 1891	
Valparaiso, Chile	Mar. 29, 1891	May 6, 1891	
Talcahuano, Chile	May 8, 1891	May 12, 1891	
Valparaiso, Chile	May 14, 1891	May 16, 1891	
Iquique, Chile	May 20, 1891	May 24, 1891	
Arica, Chile	May 25, 1891	June 4, 1891	
Iquique, Chile	June 5, 1891	June 12, 1891	
Callao, Peru	June 15, 1891	July 11, 1891	
Acapulco, Mexico	July 25, 1891	July 28, 1891	
San Diego, Cal	Aug. 6, 1891	Aug. 8, 1891	
San Francisco, Cal	Aug. 10, 1891	Aug. 13, 1891	
Navy-yard, Mare Island, Cal	Aug. 13, 1891	Aug. 29, 1891	
San Francisco, Cal	Aug. 29, 1891	Sept. 10, 1891	Sept. 7, 1891, ordered to Honolulu, Hawaiian Islands, to guard American interests in that vicinity.
Honolulu, Hawaiian Islands	Sept. 25, 1891		
Tallapoosa. Commander J. M. FORSYTH, U. S. N., commanding.			
Buenos Ayres, Argentine Republic.		Jan. 5, 1891	At Buenos Ayres, last report.
Montevideo, Uruguay	Jan. 6, 1891	May 19, 1891	
Buenos Ayres, Argentine Republic.	May 22, 1891		Unfit for further service.
Essex. Commander A. S. SNOW, U. S. N., commanding.			
Bahia, Brazil		Oct. 27, 1890	At Bahia, Brazil, last report.
Rio de Janeiro, Brazil	Nov. 1, 1890	Nov. 18, 1890	
Montevideo, Uruguay	Nov. 24, 1890	Nov. 26, 1890	
Buenos Ayres, Argentine Republic.	Nov. 26, 1890	Nov. 28, 1890	
Montevideo, Uruguay	Nov. 29, 1890	Jan. 24, 1891	
Maldonado, Uruguay	Jan. 24, 1891	Jan. 26, 1891	
Montevideo, Uruguay	Jan. 26, 1891	Feb. 22, 1891	
Maldonado, Uruguay	Feb. 22, 1891	Mar. 5, 1891	
Montevideo, Uruguay	Mar. 5, 1891		
Colonia, Uruguay	Apr. 8, 1891	Apr. 28, 1891	
Montevideo, Uruguay	Apr. 29, 1891	May 19, 1891	
Buenos Ayres, Argentine Republic.	May 22, 1891		

SQUADRON OF EVOLUTION.

Rear-Admiral JOHN G. WALKER, U. S. N., *Commander-in-chief.*

Chicago, U. S. flag ship. Capt. H. B. ROBESON, U. S N., commanding. Relieved May 12, 1891, by Capt. J. N. MILLER, U. S. N.			
New York, N. Y		Jan. 19, 1891	At New York, last report.
Fort Monroe, Va	Jan. 20, 1891	Jan. 21, 1891	
Norfolk, Va	Jan. 21, 1891	....do	
Fort Monroe, Va	....do	Jan. 24, 1891	
Galveston, Tex	Feb. 1, 1891	Feb. 6, 1881	
New Orleans, La	Feb. 9, 1891	Feb. 23, 1891	
Pensacola, Fla	Feb. 24, 1891	Mar. 10, 1891	
Tampa Bay, Fla	Mar. 12, 1891	Apr. 2, 1891	
Havana, Cuba	Apr. 4, 1891	Apr. 6, 1891	
Key West, Fla	Apr. 7, 1891	Apr. 15, 1891	

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SQUADRON OF EVOLUTION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Chicago—Continued.			
Port au Prince, Haiti	Apr. 18, 1891	Apr. 24, 1891	
Hampton Roads, Va	Apr. 29, 1891	May 6, 1891	
Norfolk Navy Yard	May 6, 1891	July 11, 1891	Flag transferred temporarily to Newark July 1.
New York, N Y	July 12, 1891	July 25, 1891	Took part in the exercises and maneuvers at New York and vicinity for the instruction of the organized naval militia.
Fisher's Island	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1881	
New York, N. Y	Aug. 4, 1891	Aug. 12, 1891	
New London, Conn	Aug. 13, 1881	Aug. 14, 1891	
Newport, R I	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	
New York, N. Y	Sept. 11, 1891	Sept. 26, 1891	
Gardiner's Bay	Sept. 27, 1891	.....	
New London, Conn	Sept. 30, 1891	Oct. 18, 1891	
New York, N. Y	Oct. 19, 1891	.....	
Newark. Capt. Silas Casey, U. S. N., commanding.			
Philadelphia, Pa	.....	May 4, 1891	Put in commission at Cramp's ship yard, Philadelphia, Pa., Feb. 2, 1891. Assigned to duty in Squadron of Evolution Apr. 16, 1891.
Hampton Roads, Va	May 6, 1891	May 7, 1891	
Yorktown, Va	May 7, 1891	May 26, 1891	
Hampton Roads, Va	May 27, 1891	May 27, 1891	
Do	May 30, 1891	June 4, 1891	
Yorktown, Va	June 4, 1891	June 16, 1891	
Hampton Roads, Va	June 16, 1891	July 1, 1891	
Boston, Mass	July 4, 1891	July 13, 1891	Took part in the exercises and maneuvers at Boston and New York for the instruction of the organized naval militia.
New York, N. Y	July 15, 1891	July 26, 1891	
Fisher's Island	July 27, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 12, 1891	
New London, Conn	Aug. 13, 1891	Aug. 14, 1891	
Newport, R. I	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	
New York, N. Y	Sept. 11, 1891	Sept. 21, 1891	
Gardiner's Bay	Sept. 21, 1891	Sept. 26, 1891	
New London, Conn	Sept. 26, 1891	Oct. 22, 1891	
Boston. Capt. JAMES O'KANE, U. S. N., commanding. Relieved Feb. 5, 1891, by Capt. G. C. WILTSE, U. S. N.			
New York, N. Y	.....	Feb. 12, 1891	At New York, last report.
Key West, Fla	Feb. 19, 1891	Feb. 28, 1891	
Off Pensacola, Fla	Mar. 2, 1891	Mar. 4, 1891	
Pensacola, Fla	Mar. 4, 1891	Mar. 5, 1891	
Off Pensacola, Fla	Mar. 5, 1891	Mar. 10, 1881	
Off Egmont Quay	Mar. 12, 1891	Mar. 18, 1891	
Tampa Bay, Fla	Mar. 18, 1891	Apr. 2, 1891	
Key West, Fla	Apr. 4, 1891	Apr. 15, 1891	
Port au Prince, Haiti	Apr. 18, 1891	Apr. 24, 1891	
Hampton Roads, Va	Apr. 29, 1891	May 6, 1861	
Norfolk, Va	May 6, 1891	June 1, 1891	
Hampton Roads, Va	June 1, 1891	June 3, 1891	
Yorktown, Va	June 3, 1891	June 20, 1891	
Hampton Roads, Va	June 20, 1891	July 1, 1881	
Boston, Mass	July 4, 1891	July 13, 1891	Took part in the exercises and maneuvers at Boston and New York for the instruction of the organized naval militia.
New York, N. Y	July 15, 1891	July 25, 1891	

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SQUADRON OF EVOLUTION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Boston—Continued.			
Fisher's Island, N. Y	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 12, 1891	
New London, Conn	Aug. 13, 1891	Aug. 14, 1891	
Newport, R. I	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	Sept. 9, 1891, detached from Squadron of Evolution and ordered to duty on North Atlantic station.
New York, N. Y	Sept. 11, 1891	Sept. 17, 1891	
Yonkers, N. Y	Sept. 17, 1891	Sept. 19, 1891	Took part in ceremonies attending the dedication of the soldiers and sailors' monument, Sept. 17, 1891. Oct. 10, 1891, detached from North Atlantic station. Oct. 21, 1891, ordered to Valparaiso, Chile, for duty on Pacific station.
New York, N. Y	Sept. 19, 1891		
Atlanta. Capt. JOHN A. HOWELL, U. S. N., commanding. Relieved Dec. 22, 1890, by Capt. J. W. PHILIP, U. S. N.			
Norfolk, Va		Feb. 12, 1891	At Norfolk, Va., last report.
Old Point Comfort, Va	Feb. 12, 1891	Feb. 13, 1891	
Key West, Fla	Feb. 19, 1891	Mar. 4, 1891	
Off Pensacola, Fla	Mar. 6, 1891	Mar. 10, 1891	
Tampa Bay, Fla	Mar. 18, 1891	Apr. 2, 1891	
Key West, Fla	Apr. 3, 1891	Apr. 15, 1891	
Port au Prince, Haiti	Apr. 18, 1891	Apr. 24, 1891	
Hampton Roads, Va	Apr. 29, 1891	May 1, 1891	
Navy-yard, Norfolk, Va	May 1, 1891	May 23, 1891	
Yorkton, Va	May 23, 1891	June 16, 1891	
Hampton Roads, Va	June 16, 1891	June 23, 1891	
Off Craney Island, Va	June 23, 1891	June 25, 1891	
Hampton Roads, Va		July 1, 1891	
Boston, Mass	July 4, 1891	July 13, 1891	Took part in the exercises and maneuvers at Boston and New York for the instruction of the organized naval militia.
New York, N. Y	July 15, 1891	July 25, 1891	
Fisher's Island	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 10, 1891	
Navy-yard, New York	Aug. 10, 1891	Aug. 15, 1891	
Newport, R. I	Aug. 16, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	
New York, N. Y	Sept. 11, 1891	Sept. 24, 1891	
Fisher's Island	Sept. 24, 1891	Sept. 26, 1891	
New London, Conn	Sept. 26, 1891	Oct. 1, 1891	
Navy-yard, N. Y	Oct. 2, 1891		
Yorktown. Commander F. E. CHADWICK, U. S. N., commanding. Relieved by Commander R. D. EVANS, U. S. N., June 18, 1891.			
New York, N. Y		Jan. 15, 1891	At New York, last report.
Hampton Roads, Va	Jan. 16, 1891	Jan. 21, 1891	
Norfolk, Va	Jan. 21, 1891	Jan. 22, 1891	
Hampton Roads, Va	Jan. 22, 1891	Jan. 24, 1891	
Galveston, Tex	Feb. 2, 1891	Feb. 6, 1891	
New Orleans, La	Feb. 9, 1891	Feb. 23, 1891	
Pensacola, Fla	Feb. 24, 1891	Mar. 10, 1891	
Tampa Bay, Fla	Mar. 12, 1891	Apr. 1, 1891	
Key West, Fla	Apr. 2, 1891	Apr. 15, 1891	
ort au Prince, Haiti	Apr. 18, 1891	Apr. 24, 1891	
ampton Roads, Va	Apr. 29, 1891	May 2, 1891	
Horktown, Va	May 2, 1891	May 3, 1891	
Hampton Roads, Va	May 3, 1891	May 13, 1891	

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SQUADRON OF EVOLUTION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Yorktown—Continued.			
Norfolk, Va	May 13, 1891	June 27, 1891	
Hampton Roads, Va	June 27, 1891	July 1, 1891	
Boston, Mass	July 4, 1891	July 13, 1891	
New York, N. Y	July 15, 1891	July 25, 1891	Took part in the exercises and maneuvers at Boston and New York for the instruction of the organized naval militia.
Fisher's Island	July 26, 1891	Aug. 3, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 12. 1891	
New London, Conn	Aug. 13, 1891	Aug. 14, 1891	
Newport, R. I	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 19, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	Sept. 9, 1891, detached from Squadron of Evolution.
New York, N. Y	Sept. 11, 1891	Oct. 8, 1891	Oct. 3, 1891, ordered to Valparaiso, Chile, for duty on Pacific station.
St. Thomas, West Indies	Oct. 14, 1891		
Concord. Commander O. A. BATCHELLER, U. S. N., commanding.			
Navy-yard, New York		May 27, 1891	Put in commission at the navy-yard, N. Y., February 14, 1891. Assigned to duty in Squadron of Evolution May 20, 1891.
Off Stapleton, S. I	May 27, 1891	May 30, 1891	
Hampton Roads, Va	May 31, 1891	June 1, 1891	
Lynnhaven Bay, Va	June 3, 1891	June 3, 1891	
Off Fort Norfolk, Va	June 3, 1891	June 15, 1891	
New York, N. Y	June 17, 1891	July 25, 1891	Took part in the exercises and maneuvers at New York and vicinity, for the instruction of the organized naval militia.
Fisher's Island	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
New York, N. Y	Aug. 4, 1891	Aug. 12, 1891	
New London, Conn	Aug. 13, 1891	Aug. 14, 1891	
Newport, R. I	Aug. 14, 1891	Aug. 18, 1891	
Tompkinsville, S. I	Aug. 19, 1891	Aug. 19, 1891	
Do	Aug. 21, 1891	Aug. 22, 1891	
New York, N. Y	Aug. 22, 1891	Aug. 25, 1891	
Bar Harbor, Me	Aug. 28, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 7, 1891	
Bridgeport, Conn	Sept. 9, 1891	Sept. 11, 1891	Sept. 9, 1891, detached from Squadron of Evolution and ordered to duty on North Atlantic station.
New York, N. Y	Sept. 11, 1891		
Bennington. Commander R. B. BRADFORD, U. S. N., commanding.			
Navy-yard, New York		Aug. 17, 1891	Put in commission at the navy-yard, N. Y., June 20, 1891. July 16, 1891, temporarily assigned to squadron of evolution.
Clifton, Staten Island	Aug. 17, 1891	Aug. 20, 1891	
Sandy Hook	Aug. 20, 1891	Aug. 21, 1891	Final trial and inspection by Board of Inspection and Survey.
Do	Aug. 23, 1891	Aug. 24, 1891	
Tompkinsville, Staten Island	Aug. 24, 1891	Aug. 26, 1891	
Navy-yard, New York	Aug. 26, 1891		
Cushing. Lieut. C. Mc. R. WINSLOW, U. S. N., commanding.			
Boston, Mass		Sept. 25, 1890	
Tarpaulin Cove	Sept. 25, 1890	Sept. 26, 1890	
Bristol, R. I	Sept. 26, 1890	....do	
Newport, R. I	....do	Sept. 27, 1890	
New London, Conn	Sept. 27, 1890	Sept. 29, 1890	
Navy-yard, New York	Sept. 29, 1890	Dec. 24, 1890	

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SQUADRON OF EVOLUTION—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Cushing—Continued.			
Bristol, R. I.	Dec. 25, 1890	Jan. 21, 1891	
Newport, R. I.	Jan. 21, 1891	Jan. 22, 1891	
Pettys Bight, Block Island	Jan. 22, 1891	Jan. 23, 1891	
Navy-yard, New York	Jan. 23, 1891	Jan. 26, 1891	
Washington, D. C.	Jan. 29, 1891	May 18, 1891	
Norfolk, Va	May 18, 1891	May 21, 1891	
Washington, D. C.	May 22, 1891	July 20, 1891	June 29, 1891, assigned temporarily to duty in Squadron of Evolution.
Norfolk, Va.	July 21, 1891	July 22, 1891	Took part in exercises and maneuvers at New York and vicinity for the instruction of the organized naval militia.
New York	July 23, 1891	July 25, 1891	
Fisher's Island	July 26, 1891	July 31, 1891	
New London, Conn	July 31, 1891	Aug. 3, 1891	
New York	Aug. 4, 1891	Aug. 12, 1891	
New London, Conn	Aug. 13, 1891	Aug. 14, 1891	
Newport, R. I.	Aug. 14, 1891	Aug. 18, 1891	
Boston, Mass	Aug. 18, 1891	Aug. 20, 1891	
Bar Harbor, Me	Aug. 21, 1891	Aug. 30, 1891	
Belfast, Me	Aug. 30, 1891	Sept. 2, 1891	
Bath, Me	Sept. 2, 1891	Sept. 4, 1891	
Portland, Me	Sept. 4, 1891	Sept. 8, 1891	
Newport, R. I.	Sept. 8, 1891	.....	Sept. 15, 1891, detached from Squadron of Evolution and attached to Torpedo Station.

PACIFIC SQUADRON.

Rear-Admiral GEORGE BROWN, U. S. N., *Commander-in-Chief.*

San Francisco. U. S. flag-ship. Capt. W. T. SAMPSON, U. S. N., Commanding.			
Navy-yard, Mare Island, Cal.	.....	Apr. 2, 1891	Put in commission at the navy-yard, Mare Island, Cal., Dec. 15, 1890. Rear-Admiral Brown transferred his flag from the Charleston to this vessel Mar. 31, 1891.
San Francisco, Cal.	Apr. 2, 1891	Apr. 8, 1891	
Acapulco, Mexico	Apr. 16, 1891	Apr. 18, 1891	March 16, 1891, Rear-Admiral Brown was ordered to proceed with San Francisco to Chilian waters, relieve Rear-Admiral W. P. McCann of command of South Pacific station and protect American interests.
Payta, Peru	Apr. 26, 1891	Apr. 29, 1891	
Callao, Peru	May 2, 1891	May 7, 1891	
Iquique, Chile	May 10, 1891	June 11, 1891	
Pisagua, Chile	June 18, 1891	June 18, 1891	
Arica, Chile	June 19, 1891	June 21, 1891	
Iquique, Chile	June 22, 1891	June 23, 1891	
Antofagasta, Chile	June 24, 1891	June 24, 1891	
Caldero, Chile	June 25, 1891	June 27, 1891	
Coquimbo, Chile	June 28, 1891	Aug. 14, 1891	
Valparaiso, Chile	Aug. 15, 1891	Sept. 14, 1891	On Aug. 28 thirty men and eighteen marines were landed from the San Francisco, under arms, to guard the United States consulate and the women and children who had taken refuge there during the days following the capture of Valparaiso.
Callao, Peru	Sept. 20, 1891	Sept. 26, 1891	
Payta, Peru	Sept. 28, 1891	Sept. 29, 1891	
Callao, Peru	Oct. 2, 1891	.....	
Baltimore. Capt. W. S. SCHLEY, U. S. N., commanding.			
Kiel, Germany	.....	Oct. 8, 1890	At Kiel, last report.
Copenhagen, Denmark	Oct. 9, 1890	Oct. 18, 1890	
Lisbon, Portugal	Oct. 23, 1890	Nov. 10, 1890	
Port Mahon, Minorca	Nov. 13, 1890	Nov. 18, 1890	
Naples, Italy	Nov. 20, 1890	Dec. 11, 1890	
Spezzia, Italy	Dec. 12, 1890	Dec. 18, 1890	

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PACIFIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Baltimore—Continued.			
Villefranche, France	Dec. 19, 1890	Jan. 28, 1891	On Jan. 26, 1891, Capt. Schley was ordered to proceed with Baltimore to Valparaiso, Chile, for duty on South Pacific station.
Toulon, France	Jan. 28, 1891	Feb. 15, 1891	
Gibraltar, Spain	Feb. 18, 1891	Feb. 20, 1891	
Porto Grande, Cape de Verde Islands.	Feb. 25, 1891	Mar. 1, 1891	
Montevideo, Uruguay	Mar. 14, 1891	Mar. 22, 1891	
Sandy Point, Straits of Magellan.	Mar. 28, 1891	Mar. 30, 1891	
Talcahuano, Chile	Apr. 3, 1891	Apr. 6, 1891	
Valparaiso, Chile	Apr. 7, 1891	May 13, 1891	Rear-Admiral McCann transferred his flag from Pensacola to this vessel on April 25, 1891.
Iquique, Chile	May 16, 1891	June 18, 1891	
Callao, Peru	June 20, 1891	July 15, 1891	
Iquique, Chile	July 19, 1891	July 20, 1891	
Caldera, Chile	July 22, 1891	July 23, 1891	
Coquimbo, Chile	July 24, 1891	Aug. 21, 1891	
Valparaiso, Chile	Aug. 21, 1891	Sept. 4, 1891	Aug. 28th, 18 marines and 36 sailors were landed from Baltimore to protect the U. S. consulate at Valparaiso.
Mollendo, Peru	Sept. 9, 1891	Sept. 9, 1891	Landed Chilean political refugees.
Valparaiso, Chile	Sept. 14, 1891	.....	
Iroquois. Commander JOSHUA BISHOP, U. S. N., commanding. Relieved Mar. 31, 1891, by Commander JOHN J. READ, U. S. N.			
Honolulu, Hawaiian Islands	.....	Oct. 31, 1890	At Honolulu, last report.
Lahaina, Hawaiian Islands	Oct. 31, 1890	Nov. 1, 1890	
Honolulu, Hawaiian Islands	Nov. 2, 1890	Nov. 8, 1890	
Pago Pago, Samoa	Dec. 1, 1890	Dec. 4, 1890	
Apia, Samoa	Dec. 5, 1890	Dec. 9, 1890	
Pago Pago, Samoa	Dec. 10, 1890	Dec. 27, 1890	
Apia, Samoa	Jan. 1, 1891	Jan. 1, 1891	
Pago Pago, Samoa	Jan. 2, 1891	Jan. 6, 1891	
Apia, Samoa	Jan. 7, 1891	Jan. 10, 1891	
Pago Pago, Samoa	Jan. 10, 1891	Jan. 16, 1891	
Apia, Samoa	Jan. 16, 1891	Jan. 24, 1891	
Do	Jan. 25, 1891	Jan. 28, 1891	
Pago Pago, Samoa	Jan. 29, 1891	Jan. 30, 1891	
Do	Jan. 30, 1891	Feb. 3, 1891	
Honolulu, Hawaiian Islands	Feb. 21, 1891	June 16, 1891	
Lahaina, Hawaiian Islands	June 17, 1891	June 17, 1891	
Honolulu, Hawaiian Islands	June 18, 1891	July 14, 1891	
Apia, Samoa	Aug. 6, 1891	Aug. 30, 1891	
Monono	Aug. 30, 1891	Aug. 30, 1891	
Apia, Samoa	Aug. 30, 1891	Sept. 15, 1891	
Pago Pago	Sept. 17, 1891	Sept. 30, 1891	
Apia, Samoa	Oct. 1, 1891	.....	
Mohican. Commander E. M. SHEPARD, U. S. N., commanding. Relieved April 23, 1891, by Commander C. S. COTTON, U. S. N.			
Honolulu, Hawaiian Islands	.....	Dec. 22, 1890	At Honolulu, last report.
Lahaina, Hawaiian Islands	Dec. 23, 1890	Dec. 24, 1890	
Hilo, Hawaii, Hawaiian Islands	Dec. 25, 1890	Dec. 29, 1890	
Lahaina, Hawaiian Islands	Dec. 29, 1890	Dec. 30, 1890	
Honolulu, Hawaiian Islands	Dec. 31, 1890	Mar. 21, 1891	
San Francisco, Cal	Apr. 9, 1891	Apr. 11, 1891	
Navy-yard, Mare Island, Cal	Apr. 11, 1891	May 28, 1891	
San Francisco, Cal	May 28, 1891	June 17, 1891	Ordered to Bering Sea for duty in connection with the seal fisheries.
Navy-yard, Mare Island, Cal	June 17, 1891	June 18, 1891	
Semiahmoo Bay, Wash	June 24, 1891	June 25, 1891	
Departure Bay, B. C	June 25, 1891	June 27, 1891	
Port Angeles, Wash	June 27, 1891	June 28, 1891	
Iliuliuk, Unalaska	July 8, 1891	July 12, 1891	Cruising.
St. George, Pribyloff Islands	July 13, 1891	July 14, 1891	
St. Paul, Pribyloff Islands	July 14, 1891	July 15, 1891	
Do	July 18, 1891	July 20, 1891	
Do	July 20, 1891	July 21, 1891	

Jan. 24, 1891, Rear-Admiral W. P. McCann was ordered to proceed with the *Pensacola* to Valparaiso, Chile, and assume command of South Pacific Station. June 29, 1891, he was ordered to New York by steamer, preparatory to returning to the South Atlantic Station.

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PACIFIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Mohican—Continued.			
Iliuliuk, Unalaska	July 27, 1891	Aug. 6, 1891	
Do	Aug. 6, 1891	Aug. 8, 1891	
St. Paul, Pribyloff Islands	Aug. 12, 1891	Aug. 12, 1891	
Iliuliuk, Unalaska	Aug. 15, 1891	Aug. 26, 1891	
Do	Sept. 1, 1891	Sept. 17, 1891	
St. Paul, Pribyloff Islands	Sept. 22, 1891	Sept. 22, 1891	
St. George, Pribyloff Islands	Sept. 23, 1891	Sept. 23, 1891	
Iliuliuk, Unalaska	Sept. 30, 1891	Oct. 8, 1891	
Ranger. Commander GEORGE E. WINGATE, U. S. N., commanding.			
Acajulta, San Salvador	.....	Oct. 3, 1890	At Acajulta, last report.
San José de Guatemala	Oct. 4, 1890	Oct. 10, 1890	
Amapala, Honduras	Oct. 12, 1890	Oct. 18, 1890	
Corinto, Nicaragua	Oct. 19, 1890	Nov. 15, 1890	
Amapala, Honduras	Nov. 16, 1890	Nov. 17, 1890	
Corinto, Nicaragua	Nov. 17, 1890	Dec. 1, 1890	
San José de Guatemala	Dec. 3, 1890	Jan. 12, 1891	
La Libertad, San Salvador	Jan. 13, 1891	Jan. 13, 1891	
Corinto, Nicaragua	Jan. 14, 1891	Feb. 24, 1891	
La Libertad, San Salvador	Feb. 25, 1891	Feb. 25, 1891	
San José de Guatemala	Feb. 26, 1891	Mar. 17, 1891	
Acajulta, San Salvador	Mar. 18, 1891	Mar. 18, 1891	
Amapala, Honduras	Mar. 19, 1891	Mar. 23, 1891	
Corinto, Nicaragua	Mar. 23, 1891	May 30, 1891	
San José de Guatemala	June 1, 1891	June 3, 1891	
Champerico, Guatemala	June 4, 1891	June 4, 1891	
Acapulco, Mexico	June 9, 1891	June 15, 1891	
Mazatlan, Mexico	June 20, 1891	June 24, 1891	
San Diego, Cal	July 3, 1891	July 10, 1891	
San Francisco, Cal	July 15, 1891	July 15, 1891	
Navy-yard, Mare Island, Cal	.....do	.....	Put out of commission at Navy-yard, Mare Island, Cal., Sept. 14, 1891.
Alert. Commander R. D. HITCHCOCK, U. S. N., commanding.			
Navy-yard, Mare Island, Cal.	.....	June 18, 1891	Put in commission at the Navy-yard, Mare Island, Cal., Oct. 9, 1890. Dec. 15, 1890, assigned to temporary duty on Pacific station.
Victoria, British Columbia	June 25, 1891	June 29, 1891	Ordered to Bering Sea for duty in connection with seal fisheries. Cruising.
Unalaska	July 9, 1891	Aug. 22, 1891	Aug. 8, 1891, detached from Pacific station and ordered to Asiatic station.
Yokohama, Japan	Sept. 10, 1891	Oct. 10, 1891	
Nagasiki, Japan	Oct. 14, 1891	Oct. 14, 1891	
Shanghai, China	Oct. 16, 1891	.....	

ASIATIC SQUADRON.

Rear-Admiral GEORGE E. BELKNAP, U. S. N., *Commander-in-Chief.*

Charleston, U. S. flagship. Capt. GEO. C. REMEY, U. S. N., commanding.			
Honolulu, Hawaiian Islands	.....	Oct. 6, 1890	At Honolulu, last report.
Lahaina, Hawaiian Islands	Oct. 6, 1890	Oct. 8, 1890	
Honolulu, Hawaiian Islands	Oct. 9, 1890	Nov. 25, 1890	
San Francisco, Cal	Dec. 4, 1890	Dec. 6, 1890	
Navy-yard, Mare Island, Cal	Dec. 6, 1890	Jan. 20, 1891	
San Francisco, Cal	Jan. 20, 1891	Jan. 22, 1891	
Honolulu, Hawaiian Islands	Jan. 29, 1891	Feb. 18, 1891	Conveyed remains of King Kalakaua to Honolulu.
San Francisco, Cal	Feb. 27, 1891	Mar. 3, 1891	
Navy-yard, Mare Island, Cal	Mar. 3, 1891	Apr. 25, 1891	
San Francisco, Cal	Apr. 25, 1891	Apr. 29, 1891	
Navy-yard, Mare Island, Cal	Apr. 29, 1891	May 7, 1891	
San Francisco, Cal	May 7, 1891	May 9, 1891	In search of Chilian steamer "Itata."
San Pedro, Cal	May 10, 1891	May 11, 1891	
Acapulco, Mexico	May 16, 1891	May 17, 1891	
Callao, Peru	May 26, 1891	May 28, 1891	
Arica, Chile	June 1, 1891	June 3, 1891	
Iquique, Chile	June 4, 1891	June 13, 1891	
San Diego, Cal	July 7, 1891	July 22, 1891	

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ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Charleston—Continued.			
San Francisco, Cal	Aug. 5, 1891	Aug. 6, 1891	After leaving San Diego the Charleston touched at Redondo Beach, San Pedro, Santa Monica, Santa Barbara, Port Harford, and Santa Cruz.
Navy-yard, Mare Island, Cal	Aug. 6, 1891	Aug. 19, 1891	Aug. 19, 1891, ordered to duty on Asiatic station.
Honolulu, Hawaiian Islands	Aug. 28, 1891	Sept. 3, 1891	
Yokohama, Japan	Sept. 22, 1891		
Lancaster. Capt. HENRY B. SEELEY, U. S. N., commanding.			
Navy-yard, Portsmouth, N. H.		Apr. 21, 1891	Put in commission at the navy-yard, Portsmouth, N. H., March 19, 1891.
New York, N. Y	Apr. 24, 1891	Apr. 25, 1891	
Navy-yard, New York, N. Y	Apr. 25, 1891	July 1, 1891	June 15, 1891, Rear-Admiral D. B. Harmony ordered to proceed with Lancaster to Asiatic station and relieve Rear-Admiral George E. Belknap of the command of that station
Off Forty-second street, New York, N. Y.	July 1, 1891	July 8, 1891	
Tompkinsville, Staten Island, N. Y	July 8, 1891	July 13, 1891	
Funchal, Maderia	Aug. 11, 1891	Aug. 18, 1891	
Cape Town, Africa	Oct. 9, 1891		
Omaha. Capt. J. B. CROMWELL, U. S. N., comanding.			
Yokohama, Japan		Oct. 4, 1890	At Yokohama, last report.
Kobe, Japan	Oct. 6, 1890	Oct. 8, 1890	
Chemulpo, Korea	Oct. 12, 1890	Oct. 17, 1890	
Nagasaki, Japan	Oct. 20, 1890	Oct. 20, 1890	
Kobe, Japan	Oct. 23, 1890	Oct. 25, 1890	
Yokohama, Japan	Oct. 27, 1890	Dec. 12, 1890	
Kobe, Japan	Dec. 15, 1890	Dec. 18, 1890	
Shanghai, China	Dec. 23, 1890	Feb. 5, 1891	
Shimonoseki, Japan	Feb. 8, 1891	Feb. 8, 1891	
Kobe, Japan	Feb. 9, 1891	Feb. 14, 1891	
Yokohama, Japan	Feb. 15, 1891	Mar. 9, 1891	Rear-Admiral Belknap transferred his flag from this vessel to the Alliance, March 9.
Acapulco, Mexico	Apr. 19, 1891	Apr. 23, 1891	
Mazatlan, Mexico	Apr. 28, 1891	Apr. 30, 1891	
San Diego, Cal	May 8, 1891	May 9, 1891	
San Pedro, Cal	May 10, 1891	May 11, 1891	
San Francisco, Cal	May 14, 1891	May 16, 1891	
Navy-yard, Mare Island, Cal	May 16, 1891		Put out of commission at the navy-yard, Mare Island, Cal., June 20, 1891.
Alliance. Commander H. C. TAYLOR, U. S. N., commanding. Relieved May 15, 1891, by Commander FELIX MCCURLEY, U. S. N.			
Jamestown Harbor, Ponapi Island, Caroline group			At Ponapi Island, last report.
Kiti Harbor, Ponipi Island	Oct. 15, 1890	Nov. 3, 1890	
Chabrol Harbor, Ualan Island	Nov. 3, 1890	Nov. 4, 1890	
Nagasaki, Japan	Nov. 6, 1890	Nov. 10, 1890	
Kobe, Japan	Dec. 4, 1890	Dec. 11, 1890	
Yokohama, Japan	Dec. 14, 1890	Dec. 26, 1890	
Owari Bay, Japan	Dec. 28, 1890	Feb. 2, 1891	
Yokohama, Japan	Feb. 3, 1891	Feb. 3, 1891	
Yokosuka, Japan	Feb. 4, 1891	Mar. 24, 1891	
Yokohama, Japan	Mar. 24, 1891	....do	
	....do	Apr. 7, 1891	Flag of Commander-in-Chief transferred to Monocacy, April 6, 1891.
Kobe, Japan	Apr. 9, 1891	Apr. 11, 1891	
Chemulpo, Korea	Apr. 18, 1891	Apr. 30, 1891	
Nagasaki, Japan	May 3, 1891	May 7, 1891	
Kaneda Bay, Japan	May 10, 1891	May 11, 1891	
Mississippi Bay, Japan	May 11, 1891	May 13, 1891	
Yokohama, Japan	May 13, 1891	May 26, 1891	
Shanghai, China	June 1, 1891	Aug. 7, 1891	
Che-foo, China	Aug. 11, 1891	Sept. 4, 1891	
Shanghai, China	Sept. 7, 1891		

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ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Monocacy. Commander M. L. JOHNSON, U. S. N., commanding. Relieved by Commander F. M. BARBER, U. S. N., Sept. 24, 1891.			
Chefoo, China	.....	Sept. 30, 1890	At Chefoo, last report.
Chemulpo, Corea	Oct. 2, 1890	Nov. 14, 1890	
Nagasaki, Japan	Nov. 16, 1890	Nov. 22, 1890	
Chemulpo, Corea	Nov. 24, 1890	Jan. 6, 1891	
Shanghai, China	Jan. 8, 1891	Feb. 5, 1891	
Chinkiang, China	Feb. 6, 1891	Feb. 14, 1891	
Hankow, China	Feb. 17, 1891	Feb. 21, 1891	
Kinkiang, China	Feb. 22, 1891	Feb. 26, 1891	
Wuhu, China	Feb. 27, 1891	Mar. 3, 1891	
Chinkiang, China	Mar. 3, 1891	Mar. 5, 1891	
Shanghai, China	Mar. 6, 1891	Mar. 18, 1891	
Kobe, Japan	Mar. 24, 1891	Mar. 30, 1891	
Yokohama, Japan	Apr. 2, 1891	Sept. 25, 1891	Flag transferred to Charleston Sept. 23, 1891.
Yokosuka, Japan	Sept. 25, 1891	Sept. 30, 1891	
Yokohama, Japan	Sept. 30, 1891	Oct. 9, 1891	
Kobe	Oct. 11, 1891	Oct. 12, 1891	
Shanghai	Oct. 17, 1891	Oct. 23, 1891*	
Palos. Lieut. T. S. PHELPS, jr., U. S. N., commanding. Relieved Jan. 22, 1891, by Lieut. Commander JOSEPH MARTHON, U. S. N.			
Chemulpo, Corea	.....	Oct. 24, 1890	At Chemulpo, last report.
Weihaiwei, China	Oct. 25, 1890	Oct. 27, 1890	
Chefoo, China	Oct. 27, 1890	....do	
Taku Bar, China	Oct. 29, 1890	Oct. 30, 1890	
Tientsin, China	Nov. 4, 1890	Mar. 25, 1891	
Tengkoo, China	Mar. 26, 1890	Mar. 26, 1891	
Taku, China	....do	....do	
Tengkoo, China	....do	Mar. 27, 1891	
Taku, China	Mar. 27, 1891	....do	
Chefoo, China	Mar. 29, 1861	Mar. 29, 1891	
Nagasaki, Japan	Apr. 2, 1891	Apr. 14, 1891	
Amoy, China	Apr. 18, 1891	Apr. 24, 1891	
Anping, Formosa	Apr. 25, 1891	Apr. 27, 1891	
Amoy, China	Apr. 28, 1891	Apr. 28, 1891	
Off Tunglung Island, China	Apr. 29, 1891	Apr. 30, 1891	
Hongkong, China	Apr. 30, 1891	May 5, 1891	
Lankeet Island, China	May 5, 1891	May 6, 1891	
Canton, China	May 6, 1891	May 22, 1891	
Wampoa Barrier, China	May 22, 1891	....do	
Hongkong, China	....do	May 24, 1891	
Bullock Harbor, China	May 27, 1891	May 28, 1891	
Chusen Island, China	May 28, 1891	May 29, 1891	
Off Kin Toan light-ship, China	May 30, 1891	May 30, 1891	
Shanghai, China	May 31, 1891	June 3, 1891	
Chingkiang, China	June 4, 1891	June 4, 1891	
Wuhu, China	June 5, 1891	June 5 1891	
Wusueh China	June 6, 1891	June 7, 1891	
Kinkiang, China	June 7, 1891	June 27, 1891	
Chingkiang, China	June 28, 1891	Aug. 2, 1891	
At anchor off Gutzlaff	Aug. 3, 1891	Aug. 4, 1891	
Pagoda Anchorage, China	Aug. 6, 1891	Sept. 4, 1891	
Wusung, China	Sept. 7, 1891	Sept. 8, 1891	
Shanghai, China	Sept. 8, 1891	.....	
Marion. Commander JOHN R. BARTLETT, U. S. N., commanding.			
Navy-yard, Mare Island, Cal.	.....	June 17, 1891	Put in commission at the navy-yard, Mare Island, Cal., April 27, 1891.
San Francisco, Cal.	June 17, 1891	July 3, 1891	
Port Townsend, Wash.	July 10, 1891	July 13, 1891	
Unalaska	Aug. 4, 1891	Sept. 7, 1891	Ordered to Bering Sea for duty in connection with the seal fisheries. Cruising.
Honolulu, Hawaiian Island	Sept. 26, 1891	.....	August 10, 1891, ordered to duty on Asiatic station.

* Flag of Commander-in-Chief transferred, temporarily, to this vessel, Oct. 25, 1891.

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ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Swatara. Commander PHILIP H. COOPER, U. S. N., commanding.			
San Francisco, Cal.	Nov. 20, 1890	Dec. 2, 1890	Enroute to San Francisco, last report.
Navy-yard, Mare Island, Cal.	Dec. 2, 1890		Put out of commission at the navy-yard, Mare Island, February 7, 1891.

SHIPS EMPLOYED ON SPECIAL DUTY.

Pinta. Lieut. Commodore O. C. FARENHOLT, U. S. N., commanding. Relieved Sept. 24, 1891, by Lieut. Commander WASHBURN MAYNARD, U. S. N.			
Glacier Bay, Alaska	July 1, 1890	July 1, 1890	
Sitka, Alaska	July 2, 1890	July 3, 1890	
Whitestone Narrows, Alaska	July 3, 1890	July 4, 1890	
Sitka, Alaska	July 4, 1890	Aug. 12, 1890	
Juneau, Alaska	Aug. 13, 1890	Aug. 22, 1890	
William Henry Harbor, Alaska	Aug. 22, 1890	Aug. 23, 1890	
Pyramid Harbor, Alaska	Aug. 23, 1890	Aug. 28, 1890	
Proloff Harbor, Freshwater Bay, Alaska.	Aug. 28, 1890	Aug. 29, 1890	
Killisnoo, Alaska	Aug. 29, 1890	Aug. 31, 1890	
Sitka, Alaska	Aug. 31, 1890	Apr. 28, 1891	
Wrangell, Alaska	Apr. 29, 1891	May 2, 1891	
Lowe Inlet, British Columbia	May 3, 1891	May 5, 1891	
Carter Bay, British Columbia	May 5, 1891	May 6, 1891	
Fort Rupert, British Columbia	May 7, 1891	May 7, 1891	
Alert Bay, British Columbia	May 7, 1891	May 8, 1891	
Forward Bay, British Columbia	May 8, 1891	May 9, 1891	
Departure Bay, British Columbia	May 10, 1891	May 11, 1891	
Esquimalt, British Columbia	May 12, 1891	June 4, 1891	
Port Townsend, Wash	June 4, 1891	June 7, 1891	
Seattle, Wash	June 7, 1891	June 13, 1891	
Alert Bay, British Columbia	June 14, 1891	June 15, 1891	
Bella-Bella, British Columbia	June 15, 1891	June 16, 1891	
Klemtoo Pass, British Columbia	June 16, 1891	June 16, 1891	
Port Simpson, British Columbia	June 17, 1891	June 18, 1891	
Burroughs Bay, Alaska	June 18, 1891	June 19, 1891	
Yes Bay, Alaska	June 19, 1891	June 20, 1891	
Loring, Alaska	June 20, 1891	June 22, 1891	
Karta Bay, Alaska	June 22, 1891	June 24, 1891	
Fort Wrangell, Alaska	June 24, 1891	June 26, 1891	
Woewodski Island, Alaska	June 26, 1891	June 27, 1891	
Juneau, Alaska	June 27, 1891	July 3, 1891	
Schultze Cove, Alaska	July 3, 1891	July 4, 1891	
Sitka, Alaska	July 4, 1891	July 15, 1891	
Pyramid Harbor, Alaska	July 16, 1891	July 19, 1891	
Lindenberg Harbor, Alaska	July 19, 1891	July 20, 1891	
Sitka, Alaska	July 20, 1891	Aug. 15, 1891	
Freshwater Bay, Alaska	Aug. 15, 1891	Aug. 16, 1891	
Pyramid Harbor, Alaska	Aug. 16, 1891	Aug. 21, 1891	
Juneau, Alaska	Aug. 21, 1891	Sept. 1, 1891	
Freshwater Bay, Alaska	Sept. 1, 1891	Sept. 2, 1891	
Killisnoo, Alaska	Sept. 2, 1891	Sept. 3, 1891	
Schultze Cove, Alaska	Sept. 3, 1891	Sept. 4, 1891	
Sitka, Alaska	Sept. 4, 1891	Sept. 30, 1891	
Thetis. Lieut. Commander C. H. STOCKTON, U. S. N., commanding. Relieved May 2, 1891, by Commander G. C. REITER, U. S. N.			
San José, Guatemala		Oct. 10, 1890	At San José, last report.
San Francisco, Cal.	Oct. 27, 1890	Oct. 29, 1890	
Navy-yard, Mare Island, Cal.	Oct. 29, 1890	May 20, 1891	
San Francisco, Cal.	May 20, 1891	June 11, 1891	
Navy-yard, Mare Island, Cal.	June 11, 1891	June 16, 1891	
San Francisco, Cal.	June 16, 1891	June 17, 1891	
Sand Point, Popoff Island, Alaska	June 29, 1891	June 29, 1891	Ordered to Bering Sea for duty in connection with the seal fisheries. Cruising.
Unalaska, Alaska	July 3, 1891	Oct. 6, 1891	
San Francisco, Cal.	Oct. 22, 1891		

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SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Yantic. Commander C. H. ROCKWELL, U. S. N., commanding. Relieved Aug. 31, 1891, by Lieut. Commander SAMUEL BELDEN, U. S. N.			
Navy-yard, New York		Jan. 28, 1891	At New York, last report. (Undergoing repairs.) Destroyed wrecks of Spanish steamer Viscaya and schooner Hargraves off Barnegat Jan. 29 and 30.
Do	Jan. 31, 1891	Feb. 14, 1891	
Newport, R. I.	Feb. 15, 1891	Feb. 17, 1891	Destroyed wreck of schooner Minnie and Gussie off Cape Henlopen, and wreck of coal barge off Cape May, Feb. 23 and 24.
New York Harbor	Feb. 27, 1891	Mar. 4, 1891	March 7, destroyed wrecks of schooner Howard Williams and coal barge Norman off Absecon Light
Hampton Roads, Va.	Mar. 9, 1891	Mar. 10, 1891	March 10, blew off upper part of mast of wreck off Wachapreague Inlet, coast of Virginia, leaving about 15 feet above water as permanent danger mark.
Do	Mar. 13, 1891	Mar. 14, 1891	
Port Royal, S. C.	Mar. 19, 1891	Mar. 28, 1891	
Hampton Roads, Va.	Apr. 3, 1891	Apr. 4, 1891	
Do	Apr. 6, 1891	Apr. 10, 1891	Searching for wreck off Bodie Island.
New York navy-yard and harbor.	Apr. 13, 1891	July 22, 1891	On passage to New York, blew up wreck of barkentine Ada P. Gould, near Cape Charles light-ship. Fired a salute of 21 guns on April 27 when ground was broken at Riverside Park, North River, New York, preparatory to the erection of the monument to the late Gen. Grant.
New York harbor and navy-yard.	July 25, 1891	Oct. 10, 1891	Destroyed an obstruction to navigation near Cape Charles light-ship July 24. Oct. 5, 1891, ordered to Montevideo, Uruguay, for duty on South Atlantic Station.
Navy-yard, Norfolk, Va	Oct. 14, 1891		Went to the assistance of the Despatch, aground off Assateague Island.
Michigan. Commander G. H. WADLEIGH, U. S. N., commanding.			
Buffalo, N. Y.		Oct. 24, 1890	At Buffalo, N. Y., last report.
Erie, Pa	Oct. 24, 1890	June 2, 1891	In winter quarters.
Buffalo, N. Y	June 2, 1891	June 18, 1891	
Erie, Pa	June 18, 1891	June 30, 1891	
Buffalo, N. Y.	June 30, 1891	July 6 1891	Took part in the celebration of the reunion of the Society of the Army of the Potomac at Buffalo, July 3 and 4.
Erie, Pa	July 6, 1891	July 10, 1891	
Cleveland, Ohio	July 10, 1891	July 23, 1891	
Put-in Bay, Ohio	July 23, 1891	July 27, 1891	
Detroit, Mich.	July 27, 1891	Aug. 12, 1891	Took part in the ceremonies attending the National Encampment of the Grand Army of the Republic at Detroit during the first week in August.
Port Huron, Mich	Aug. 12, 1891	Aug. 13, 1891	
Sault St. Marie, Mich.	Aug. 14, 1891	Aug. 17, 1891	
Marquette, Mich	Aug. 18, 1891	Aug. 20, 1891	
Houghton, Mich	Aug. 20, 1891	Aug. 23, 1891	
Duluth, Minn.	Aug. 24, 1891	Aug. 28, 1891	
Copper Harbor, Mich.	Aug. 29, 1891	Aug. 30, 1891	
Sault St. Marie, Mich.	Aug. 31, 1891	Sept. 1, 1891	
Lime Island, Mich	Sept. 1, 1891	Sept. 2, 1891	
Mackinac Island, Mich.	Sept. 2, 1891	Sept. 6, 1891	
Milwaukee, Wis	Sept. 7, 1891	Sept. 16, 1891	
Chicago, Ill.	Sept. 16, 1891	Oct. 9, 1891	Took part in ceremonies attending the dedication of a monument to Gen. Grant at Chicago on October 8th.
Detroit, Mich.	Oct. 16, 1891		En route to Detroit touched at Harbor Springs, McLeod Bay, Middle Island, Sand Beach, and Algonac.

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SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Despatch. Lieut. William S. COWLES, U. S. N., commanding.			
Washington, D. C		Nov. 5, 1890	At Washington last report.
New York, N. Y	Nov. 7, 1890	Nov. 18, 1890	
Jersey City, N. J	Nov. 18, 1890	....do	
New York, N. Y	....do	Nov. 22, 1890	
Washington, D. C	Nov. 24, 1890	Nov. 29, 1890	
Mt. Vernon, Va	Nov. 29, 1890	....do	
Washington, D. C	....do	Feb. 13, 1891	
Hampton Roads, Va	Feb. 14, 1891	Feb. 15, 1891	
Washington, D. C	Feb. 16, 1891	Apr. 15, 1891	
Hampton Roads, Va	Apr. 16, 1891	Apr. 16, 1891	
Navy-yard, Norfolk, Va	....do	Apr. 19, 1891	
Hampton Roads, Va	Apr. 19, 1891	Apr. 20, 1891	
Newport News, Va	Apr. 20, 1891	....do	
Hampton Roads, Va	....do	....do	
Washington, D. C	Apr. 21, 1891	Apr. 24, 1891	
Mt. Vernon, Va	Apr. 24, 1891	....do	
Washington, D. C	....do	Apr. 25, 1891	
Hampton Roads, Va	Apr. 26, 1891	Apr. 27, 1891	
Washington, D. C	Apr. 28, 1891	May 7, 1891	
Mt. Vernon, Va	May 7, 1891	....do	
Washington, D. C	....do	May 9, 1891	
Indian Head, Md	May 9, 1891	May 10, 1891	
Quantico, Va	May 10, 1891	May 11, 1891	
Washington, D. C	May 11, 1891	June 1, 1891	
Annapolis, Md	June 2, 1891	June 6, 1891	
Washington, D. C	June 7, 1891	July 28, 1891	
New York, N. Y	July 30, 1891	Aug. 1, 1891	
New London, Conn	Aug. 2, 1891	Aug. 3, 1891	
Northeast Harbor, Me	Aug. 4, 1891	Aug. 5, 1891	
Bar Harbor, Me	Aug. 5, 1891	Aug. 10, 1891	
Mount Desert Ferry, Me	Aug. 10, 1891	....do	
Bar Harbor, Me	....do	Aug. 27, 1891	
Rockland, Me	Aug. 27, 1891	Aug. 29, 1891	
New York, N. Y	Aug. 30, 1891	Oct. 9, 1891	The Despatch, en route to Washington, D. C., was wrecked October, 10, 1891, off Assateague Island, coast of Virginia.
Fern. Lieut. Commander A. J. IVERSON, U. S. N., commanding.			Put in commission at the navy-yard, New York, April 23, 1891. Engaged in carrying freight between the different navy-yards and stations.
Albatross. Lieut. Commander Z. L. TANNER, U. S. N., commanding.			
Navy-yard, Mare Island, Cal		Oct. 5, 1891	Transferred, temporarily, by the U. S. Commissioner of Fish and Fisheries to the Navy Department for the purpose of making an ocean survey for a telegraphic cable between San Francisco and Honolulu, as provided by the act of Congress approved March 3, 1891.
San Francisco, Cal	Oct. 5, 1891		
Santa Cruz, Cal	Oct. 9, 1891		
Monterey, Cal	Oct. 22, 1891		

APPRENTICE TRAINING SHIPS.

Portsmouth. Commander JOHN SCHOULER, U. S. N., commanding. Relieved June 25, 1891, by Commander CHARLES D. SIGSBEE, U. S. N.			
New York, N. Y		Oct. 21, 1890	At New York, last report.
Hempstead Harbor, L. I	Oct. 21, 1890	Oct. 27, 1890	
Newport, R. I	Oct. 28, 1890	Nov. 7, 1890	
Lynn Haven Bay, Va	Nov. 11, 1890	Nov. 12, 1890	
Fort Monroe, Va	Nov. 12, 1890	Nov. 17, 1890	
Norfolk, Va	Nov. 17, 1890	....do	
Navy-yard, Norfolk, Va	....do	Jan. 13, 1891	Practice cruise for instruction of naval apprentices.
Bridgetown, Barbados Island	Feb. 6, 1891	Feb. 17, 1891	

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APPRENTICE TRAINING SHIPS—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
Portsmouth—Continued.			
Gulf of Paria	Feb. 18, 1891	Feb. 24, 1891	
Port of Spain, Trinidad	Feb. 24, 1891	Apr. 1, 1891	
St. Thomas, West Indies	Apr. 8, 1891	Apr. 16, 1891	
Fort Monroe, Va	May 1, 1891	May 25, 1891	
Norfolk, Va	May 25, 1891	June 1, 1891	
Fort Monroe, Va	June 1, 1891	June 12, 1891	
Newport, R. I	June 16, 1891	July 10, 1891	
Plymouth, England	Aug. 10, 1891	Aug. 21, 1891	
Funchal, Madeira	Sept. 11, 1891	Sept. 19, 1891	
Newport, R. I	Oct. 20, 1891		
Jamestown. Commander B. P. LAMBERTON, U. S. N., commanding.			
New York, N. Y		Oct. 27, 1890	At New York, last report.
Newport, R. I	Oct. 28, 1890	Nov. 7, 1890	
Hampton Roads, Va	Nov. 12, 1890	Nov. 19, 1890	
Yorktown, Va	Nov. 21, 1890	Dec. 3, 1890	
Hampton Roads, Va	Dec. 11, 1890	Dec. 16, 1890	
Norfolk, Va	Dec. 16, 1890	Dec. 17, 1890	
Navy-yard, Norfolk, Va	Dec. 17, 1890	Jan. 15, 1891	
Port Royal, S. C	Jan. 31, 1891	Mar. 24, 1891	
Barbadoes	Apr. 8, 1891	Apr. 11, 1891	Practice cruise for instruction of naval apprentices.
St. Thomas, West Indies	Apr. 14, 1891	Apr. 16, 1891	
Hampton Roads, Va	Apr. 30, 1891	May 22, 1891	
New York, N. Y	May 27, 1891	June 11, 1891	
Newport, R. I	June 12, 1891	July 9, 1891	
Plymouth, England	Aug. 21, 1891	Aug. 21, 1891	
Funchal, Madeira	Sept. 14, 1891	Sept. 19, 1891	
Hampton Roads, Va	Oct. 18, 1891		
Monongahela. Commander J. H. SANDS, U. S. N., commanding.			
Navy-yard, Portsmouth, N. H		Apr. 13, 1891	Put in commission at the navy-yard, Portsmouth, N. H., March 17, 1891.
Newport, R. I	Apr. 19, 1891	June 23, 1891	
Fayal, Azores	July 7, 1891	July 20, 1891	
Funchal, Madeira	Aug. 11, 1891	Aug. 24, 1891	Practice cruise for instruction of naval apprentices.
Puerto de la Lus, Gran Canaria	Aug. 29, 1891	Sept. 2, 1891	
Gibraltar, Spain	Sept. 17, 1891	Sept. 29, 1891	
Port Mahon	Oct. 12, 1891		

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B.

REPORT OF THE SUPERINTENDENT OF THE NAVAL ACADEMY.

U. S. NAVAL ACADEMY,
Annapolis, Md., October 3, 1891.

SIR: I have the honor to submit a report of the operations of the U. S. Naval Academy during the past academic year.

The following statement shows the numbers of the several classes at the commencement of the academic year beginning October 1, 1891:

First class (line division, 36; engineer division, 6)	42	Third class	63
Second class	54	Fourth class	84

At the annual examination in June, 1891, 40 naval cadets of the line division and 7 of the engineer division completed the four years' course and received certificates of proficiency. Of these 3 of the line division applied for and received honorable discharges; the others were detached from the Academy and ordered into active sea service.

At the same examination 30 members of the class appointed in 1885 successfully passed the final graduating examination and were subsequently assigned as follows:

To the line of the Navy	18
To the Engineer Corps	5
To the Marine Corps	6

The course of instruction as approved by the Department and the prescribed routine of drills and exercises have been adhered to.

The property recently purchased for the extension of the grounds of the Academy has been paid for and is now in possession of the Government, except the bed of Wagner street and the wharf at the end of that street. These belong to the city of Annapolis, and although a price for them was awarded by the commission which condemned the property for public use, the purchase money has not yet been paid. The matter is in the hands of the acting district attorney, who has been requested to settle it.

The new inclosing wall, extending from the bridge over College (or Graveyard) Creek, on King George street to Wagner street, thence to the old limits of the Academy grounds, is nearly completed.

The work of grading the new grounds is in progress and will continue until the appropriation therefor shall be exhausted.

Of the buildings on the newly acquired property, two have been converted into temporary quarters for officers; the others have been condemned as worthless for Government use and are being torn down.

Two double brick houses for officers' quarters are being built under the contract made by the Bureau, and there is a reasonable prospect that they will be completed within the contract time, viz: by January 1, 1892.

The Government has acquired by recent purchase the land which obstructed the opening of King George street to Maryland avenue, with the condition that the late owner shall remove the buildings therefrom

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by October 1. This part of his agreement is now nearly complied with, and the street will be open for general traffic in a few days.

The U. S. S. *Enterprise*, the vessel assigned by the Department as a training ship, to take the place of the *Wyoming*, arrived on September 18.

A copy of the report of the commanding officer of the practice ship *Constellation* is appended, also a synopsis of the ship's journal, showing the number of days under way for instruction and the occupation of those days when the weather prevented the ship being worked, and a tabulated statement of evolutions performed by each cadet of the first class. From these it is evident that the short period allotted to the annual practice cruise has been most judiciously spent.

Upon the arrival of the ship in the outer roads I went on board and caused her to be got under way and handled. The cadets of the first class performed the duties of the executive and of lieutenants without interference or assistance of any kind in a manner creditable to themselves and to their instructors.

Two instances of gear parting, such as often happens at sea, occurred. The readiness with which the necessary orders were given and the promptness with which they were obeyed indicated that the cadets had profited by the instructions and practice which they had received.

The general bearing of the cadets, their familiarity with their duties, the systematic and orderly manner in which they performed the work of making and reducing sail, manning gear, etc., reflect the highest credit upon Commander Chester and the other officers of the *Constellation.*

I append hereto a statement showing the appropriation for the support of the Naval Academy for the fiscal year ending June 30, 1891.

Very respectfully, your obedient servant,

R. L. PHYTHIAN,
Captain, U. S. Navy, Superintendent.

The CHIEF OF BUREAU OF NAVIGATION,
Navy Department, Washington, D. C.

Statement of the appropriations of the U. S. Naval Academy for the fiscal year ending June 30, 1891.

Headings of the appropriations.	Amount appropriated.	Expended to Sept. 30, 1891.	Unexpended balances.	Liabilities for articles ordered prior to June 30, 1891.	Balance in excess of liabilities.
Pay of professors and others	$52,323.00	$52,304.01	$18.99	.....	$18.99
Special course	5,000.00	2,246.67	2,753.33	$1,341.00	1,412.33
Pay of watchman and others	44,069.95	44,069.72	.23	.....	.23
Pay employés steam engineering department	7,824.50	7,823.11	1.39	.....	1.39
Heating and lighting (including transfers by order Navy Department)	17,322.30	16,611.83	710.47	689.35	21.12
Contingent and miscellaneous	40,300.00	38,734.30	1,565.70	1,022.68	543.02
Board of Visitors	1,500.00	1,499.72	.28	.....	.28
Repairs, general	21,000.00	19,749.91	1,250.09	1,141.50	108.59
Furniture for cadets' quarters	6,500.00	5,007.00	1,493.00	1,475.00	18.00
Total	195,839.75	188,046.27	7,793.48	5,669.53	2,123.95

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In addition to the above, the following general appropriations have been made and now stand as indicated:

For rebuilding gymnasium, $20,000.

This amount being inadequate for the purpose, an additional appropriation has been asked for.

For purchase of land to open King George street and expense of opening said street, $3,500.

The land has been purchased for $3,100, and the balance will be used in opening the street.

For four houses for instructors, $20,000.

The houses are now being built by contract and payments will be made as work progresses.

U. S. S. CONSTELLATION, THIRD RATE,
Annapolis, Md., August 31, 1891.

SIR: I have the honor to submit my report of the annual practice cruise of this vessel, under my command.

The cadets on board consisted of—

First class	36
Third class	61
Fourth class	19
Total	116

and they were embarked Saturday evening, June 6.

On Monday stores were received on board, and we took our departure from Annapolis Thursday, June 9, 1891.

In accordance with your instructions, I stopped at Fort Monroe for supplies and the men which were required to fill our complement.

Only 6 men were received, and the ship put to sea about 45 short of her allowance.

Owing to light winds, Fortress Monroe was not reached until June 19, but the time in Chesapeake Bay was well spent familiarizing the crew, as well as the cadets, with their different stations.

The ship sailed from Hampton Roads June 22 for New London, Conn., where she arrived June 29. The passage up was in variable weather, which gave the cadets, who were standing regular watches as seamen, a good opportunity for practical instruction.

Details from the first class were made for duty as officers of the deck, and junior officers of a ship's company.

After taking in supplies at New London we proceeded out into Long Island Sound July 1 and commenced a series of evolutions, with cadets of the first class in charge of the deck, which continued on all week days except Saturday, whenever the circumstances were suitable, until August 6, when we left the Sound for Newport, R. I.

When the weather did not permit the ship to get under way, the working days were spent in exercises with heavy spars, carrying out anchors, and other practical or theoretical instruction.

During the cruise we happened to be in port at the same time with the following United States vessels of war: *Philadelphia, Chicago, Newark, Atlanta, Boston, Yorktown, Concord, Vesuvius,* and *Cushing,* and the cadets were permitted to inspect those of different types. This was done under the supervision of the instructors, and thus they had an opportunity of gaining a knowledge of nearly all the newer vessels of the service.

During the last week of our stay in the vicinity of New London, the squadron of evolution, under command of Rear Admiral J. G. Walker, U. S. N., was engaged in a series of exercises, for the instruction of the battalion of naval militia of New York State, off Fishers Island.

By the permission of the Admiral, the cadets were permitted to take passage on board the different vessels of the squadron when under way, as well as to witness the operations of the naval brigade on shore.

I regard this week's experience as highly beneficial to the cadets, enabling them to get instruction on subjects of vital importance to them in the future.

Arriving at Newport, August 7, the cadets were sent to the Torpedo Station, and, by direction of Commander T. F. Jewell, the commandant, were instructed in many things pertaining to torpedo warfare, by the officers of the station.

Leaving Newport, August 17, the ship proceeded on our return to Annapolis, reaching the Chesapeake Bay August 23 and Annapolis August 28. During the cruise of eighty-one days the ship has been under way forty-nine days, of which twenty were at sea.

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While no heavy gales were met during the cruise, a sufficient variety of weather, including strong winds and heavy squalls, was encountered to give the cadets a fair groundwork of experience on which to build in future years.

It is my pleasure to report that, as a rule, the conduct of the cadets has been unexceptionable, and they have reflected credit on themselves and on the service.

In the instruction of the cadets, I have been assisted by a body of officers who have shown an intelligence and zeal in the work I have rarely seen equaled, and I believe their faithful attention to duty will be productive of good to the cadets.

I submit (marked A) a synopsis of the journal of the ship, showing the number of days under way for instruction, and the occupation of those days when the weather prevented the ship being worked; a tabulated statement (marked B) of the evolutions performed by each cadet of the first class; also (marked C), a list of cadets embarked during the cruise.

Very respectfully,

C. M. CHESTER,
Commander, U. S. Navy, Commanding.

Capt. R. L. PYTHIAN, U. S. N.,
Superintendent U. S. Naval Academy.

NOTE.—The papers marked, respectively, A, B, and C are omitted.

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C.

REPORT OF THE HYDROGRAPHER TO THE BUREAU OF NAVIGATION.

HYDROGRAPHIC OFFICE,
BUREAU OF NAVIGATION, NAVY DEPARTMENT.

SIR: I have the honor to submit the following report of this Office for the fiscal year ending June 30, 1891:

By the detachment of Capt. H. F. Picking, U. S. Navy, in September, 1890, I became Acting Hydrographer, and was regularly assigned as Hydrographer on June 1, 1891.

I am pleased to report that the general condition and working of the office are very satisfactory.

SURVEYING OPERATIONS.

I regret that exigencies of the service have during the past year interrupted the survey along the Mexican coast, on the Pacific, and temporarily diverted the *Ranger* and *Thetis* to general service. The results of the surveying operations carried on during the season of 1889 and 1890, in continuation of the survey of the coast of Lower California, between San Bartolomé Bay and Abreojos Point, were received in January, and have been prepared for engraving. During the year schemes were prepared for a survey for a submarine cable route from San Francisco to New Zealand, via Honolulu; and also for the general examination of the Pacific Ocean, west of the Hawaiian Islands.

There is great need of survey work being done in the Caribbean Sea, particularly the south side of Cuba and along the Spanish Main, sections navigated extensively by American vessels. These coasts are dangerous, and existing charts are very inaccurate; no complete surveys of them have ever been made. The former was examined between 1832 and 1837, and the latter in 1816 and 1817 Schemes for the survey of all these sections have been drawn; also for the Gulf of Maracaibo and the mouth of the Orinoco. Our commerce is rapidly increasing in these water, and it is hoped that it will be found possible to detail some vessel to do this much-needed work.

DEEP-SEA SOUNDINGS.

This office has had for several years, in course of construction, a series of bathymetric charts. These deep-sea sounding sheets, covering all the oceans on a uniform scale of 1½ inches to the degree of longitude, are complete to date. They serve the double purpose of enabling the office to reach a conclusion as to whether reported dangers in the open ocean actually exist, and of providing a basis for the gradual construction of complete bathymetric charts. It is believed that the publication of these sounding sheets in their present form would aid in the advancement of this important work, because vessels engaged in sounding the depths of the ocean would then be enabled to make their results more

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profitable by directing attention to the unsounded parts. Great interest has developed in the investigation of the bottom of the sea in the past year or two, for scientific purposes as well as for purposes of navigation. Much bathymetric information has been obtained in the past few years from English surveys of cable routes.

OURDAN-KOLB ENGRAVING MACHINE.

In the engraving of charts, particularly those that have a large number of soundings, a great saving of time and labor would result from the use of the Ourdan-Kolb engraving machine. This machine has been in the experimental stage for several years, until now a most useful machine for engraving figures has been perfected. The soundings on sheet No. 1255, harbor of Shanghai, China, published by this office in April of this year, were engraved experimentally by this machine, the whole number of soundings being cut in six hours, and it has been reported upon most favorably by a board composed of officers from this Office and the U. S. Coast and Geodetic Survey. The machine is now in the hands of a stock company. I have not thought it proper to make any recommendations as to the purchase of this machine until the company is able to fix the price. The company is now canvassing to see what demand there is likely to be for such a machine.

DISTANCES.

This Office has almost daily applications for distances between various ports, from different government authorities and from outside parties, which inquiries have been much increased of late on account of the proposed subsidy mail routes. It is necessary that accuracy and uniformity should prevail when these distances are given, and the policy has been adopted by this office to mathematically determine all distances, and not to trust to measurement on charts, which vary much, due to the shrinkage and expansion of paper. Some foreign charts have been found to differ more than half an inch in a dimension of the same chart, being due to the way it was printed when the sheet was damp, which is the nsual necessary condition of paper, dry proofs requiring too much time and care and being made only for exchange between hydrographic offices, for measurement and reproduction.

It is desirable that the Government should have for its use a complete series of tables, that should be standard in all cases, of distances from each United States port to every foreign port of the world. Such a publication would be extensive and would require much labor in preparation, but could be rapidly and accurately handled with the present facilities of this Office, in six months, by a temporary increase of computers, at an expense say of $3,000, which would require a special appropriation. The need of such a publication for government and commercial uses is self-evident.

A PILOT CHART OF THE NORTHWESTERN LAKES.

The popularity of the Pilot Chart for the North Atlantic Ocean and the benefit it has been to the shipping interests, has induced a demand for a publication of a similar nature by this office for the northwestern lakes during the season of navigation. In the publication of suitable charts, notices to mariners, etc., but little is done for the commerce of the Great Lakes, particularly when we consider its growing and now

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colossal importance. The last session of the previous Congress authorized the establishment of a branch hydrographic office at Chicago, but the increase of the appropriation, $2,500, for its maintenance, was not granted. I have submitted estimates this year for the same amount for the establishment of a branch office at Chicago, and for $5,000 for the publication of a pilot chart for the Great Lakes.

DERELICTS.

The general demand that tracks of commerce along our coasts should be kept clear of derelicts, the large number of which are shown each month on the Pilot Chart as dangerous to navigation, leads me to repeat the suggestion of former hydrographers of the need of the maintenance of a regular vessel for the destruction of derelicts. The work of the U. S. S. *Yantic* last winter shows how efficient a single vessel would be in keeping the water for miles off our coast free from derelicts, to the security of commerce, navigation, and the protection of life.

TERRESTRIAL MAGNETISM.

Hitherto the investigations into the subject of terrestrial magnetism have been confined almost exclusively to the variation of the compass, but with the evolution of modern ships the necessity of giving attention to the dip and horizontal force has thrust itself forward. I believe it to be necessary that the Department should take steps for the collection of data relating to these latter elements, as well as the variation. For the past five years this Office has been engaged in the collection and discussion of observations of the magnetic declination (variation of the compass), dip, and intensity. Attention has been almost wholly confined to the treatment of the variation of the compass in order to supply the correct direction of the magnetic meridian on the charts, and it is believed that this part of the subject can now be successfully dealt with. But I desire to call attention to the lack of information respecting the dip and horizontal force. These data, for all iron and steel vessels, are very essential for correct compass work, and they should be observed and embodied in isoclinic and isodynamic charts for issue to United States vessels and for the benefit of mariners generally. There are at present no correct general charts of these kinds. In a few months after a modern cruiser is launched the coefficients for all the compasses on board are known. With the coefficients, the changes in the deviation of any compass in any part of the world can be readily computed without the time-consuming process of swinging ship, provided the dip and horizontal force are known. Hence these data become of vast importance to the Navy Department and to the mercantile marine, and it is recommended that dip circles and magnetometers be supplied to the vessels of the Navy, and that reports of the results of the observation of the elements be required.

I think it proper to call your attention to the very satisfactory work performed in the Chart Construction Division under the management of Mr. G. W. Littlehales. The means and methods employed are up to the times, and results are promptly given, and the execution is not excelled by any office doing similar work in any country. Fifty-seven new charts have been published during the year. These charts will be referred to in detail in this report under the division head. The information received through the branches of this office, from foreign hydrographic offices, and from vessels in the service of the Government, has been

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speedily incorporated into the charts affected, and no chart has been issued from the office for purposes of navigation without having the latest information embodied in it. New and much simpler methods of treating the problem of great-circle sailing, by means of gnomonic charts, have been devised, and a new series of great-circle sailing charts, covering the navigable waters of the globe, is in course of preparation

The increase in the production and efficiency of this division has been due to a great extent to the employment of various mechanical devices, several of which are inventions of employés of the office.

BRANCH OFFICES.

The number of branch offices at present established is the same as when the Hydrographer's report was last submitted. Congress has given authority for the establishment of additional branch offices at the ports of Portland, Me., Chicago, Ill., and Port Townsend, Wash.; but as it did not increase the appropriation for the maintenance of the branch offices, which is not sufficient for the proper maintenance of those already established, it was impossible to organize them.

The system of branch offices has now been long enough established to be thoroughly tested; and the favorable criticism of individuals, commendatory notes in shipping journals, and formal resolutions of maritime associations, give ample testimony of the benefits they are instrumental in bestowing upon the maritime community. They are highly successful in keeping the Hydrographic Office in intimate touch with the shipping communities, enabling it to learn the wants of navigators and to collect and supply information. Liberal means ought, therefore, to be provided, not only to keep each office at the highest point of efficiency, but also to so extend the system as to bring the advantages which it offers to all the more important ports of our coast.

The Office is under great obligations to many private individuals, to public officials, especially some connected with the customs service, to shipping firms, and maritime associations, for assistance and many acts of kindness and courtesy to the officers in charge of the branch offices.

The following memoranda and table give a brief summary of the condition of each branch office.

Boston.—Lieut. W. H. Everett, U. S. Navy, has been in charge of this office since September 18, 1890, when he relieved Lieut. F. W. Coffin, U. S. Navy, who had charge from August 1, 1890, the date of detachment of Lieut. David Peacock, U. S. Navy. The work of this office has been hampered by inadequate and inconvenient quarters, it being necessary to keep charts and a large portion of the material for distribution in a part of the building away from that occupied by the officer in charge and his assistants. Owing to the divided water front of the city, much time is lost by the ship visitor in getting from ship to ship; and ships in the stream can not be visited at all, so that it is possible that many reports of importance are missed. If a steam launch from the navy-yard were put at the disposal of this office, during certain hours of the day, for ship visiting, the work would be much facilitated.

New York.—Lieut. Arthur P. Nazro, U. S. Navy, was in charge of this branch until near the end of the fiscal year when he was detached, being relieved by Lieut. O. W. Lowry, U. S. Navy. I beg to call your attention to the valuable work done by Lieut. Nazro at this office, of which he was in charge from January 10, 1890.

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The Office also loses the service of Mr. F. S. Levis, nautical expert, who was commissioned lieutenant in the Revenue Marine Service. Mr. Levis's energy and skill did much to raise the office to its present state of efficiency and popularity.

The last Congress made an appropriation for office rent for this branch, which became available on July 1. As soon as official notice of the act of Congress was received the officers of the Maritime Exchange very courteously prepared office room for immediate occupancy, so that it was possible to move into satisfactory quarters before the expiration of the fiscal year.

Philadelphia.—Lieut. E. H. Gheen, U. S. Navy, has been in charge of this branch since May 13, 1891, when he relieved Ensign James G. Doyle, U. S. Navy, who had charge since May, 1890.

The time ball on top of the Commercial Exchange, where it is well placed for the use of navigators, ought to be put into working order as soon as possible; the appropriation for the office has not thus far permitted the small expense required for repairs. The ball has not been dropped since October, 1889.

Baltimore.—Ensign G. R. French, U. S. Navy, has been in charge of this branch since September 15, 1890, when he relieved Lieut. J. P. Parker, U. S. Navy.

The office now occupies convenient quarters in the custom-house, and will be fully equal to dealing with the business arising from the promised increase in the number of vessels sailing from Baltimore.

Norfolk.—Lieut. Henry H. Barroll, U. S. Navy, has been in charge of this branch during the whole of the past fiscal year, and under his energetic and careful direction the usefulness of this office has been greatly increased.

It is very desirable to have an active agent at Lambert's Point for collecting data from steamers from the West Indies, New Orleans, and Galveston, which stop there for coal before crossing the Atlantic. It is not possible to board all of these vessels, as the coaling facilities are such that they need remain in port a few hours only.

The necessity of a time-ball service at this port is great, and means for establishing it ought to be provided as soon as possible.

Savannah.—Lieut. Francis H. Sherman, U. S. Navy, has been in charge of this branch during the whole of the fiscal year, and has brought the office to a high state of efficiency and usefulness.

New Orleans.—Lieut. W. S. Hughes, U. S. Navy, has been in charge of this branch since November 17, 1890. He has been very successful in bringing the work and publications of the Hydrographic Office to the knowledge of the shipping community of New Orleans and of the Gulf coast generally; and the office is now in condition to carry out fully the purpose for which it was established.

The time ball, which is now dropped from the top of the Cotton Exchange, will, if possible, be changed to the roof of the custom-house, where it could be seen from a much more extended section of the water front than at present.

San Francisco.—Lieut. T. Dix Bolles, U. S. Navy, in charge of this branch, relieved Lieut. H. P. McIntosh, U. S. Navy, on April 25, 1891.

The demand for the "Special Bulletins" issued by this office, only three of which could be published during the past year from lack of funds, gives a clear indication of the service which a pilot chart of the Pacific (on a plan similar to that published for the North Atlantic) would render to navigators of that ocean. As many as possible of the reports relating to the Pacific are now being plotted at this office, to be

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made of immediate use to shipmasters, and also to serve as a base for the pilot chart when it is established.

The time-ball service is efficiently maintained, the ball being dropped automatically from the signal station on Telegraph Hill by direct wire from the Observatory at Mare Island, through the branch office in Merchants' Exchange. This service is much appreciated by shipmasters, who were formerly entirely dependent on shore ratings of their chronometers, and frequently these ratings became misleading, due to the liability of rough handling in transferring to the ship in the bay, probably in heavy weather, the day of sailing.

Portland.—Lieut. David Peacock, U. S. Navy, has been in charge of this branch since October 2, 1890, when he relieved Ensign Douglass F. Terrell, U. S. Navy.

A great deal of useful information has been extracted from the log books of vessels touching at Portland; and it is much to be regretted that it can not be made available at once for the use of shipmasters. A time-ball service ought to be established at once.

	Boston.	New York.	Philadelphia.	Baltimore.	Norfolk.	Savannah.	New Orleans.	San Francisco.	Portland, Oregon.
Reports received and forwarded to main office.									
Greenwich noon observations	603	2,888	745	154	18	129	187	237	43
Abstract of logs and meteorological journals	28	54	16	2	2	8	3	21	461
Miscellaneous reports on meteorologic and other phenomena, dangers to navigation, etc	2,708	4,027	1,620	237	91	373	58	366	799
Publications, etc., distributed.									
Hydrographic bulletins	4,200	1,800	2,700	1,800	840	600	900	.....	.....
Pilot charts and supplements	5,015	11,600	3,170	1,730	1,655	375	1,315	263	173
H. O. notices to mariners	176,100	198,100	83,990	17,275	8,995	8,695	35,870	22,170	10,880
Light lists, beacon and buoy lists	7,174	1,692	1,473	417	1,186	723	1,220	321	493
Monthly weather reviews, Signal Service	1,132	1,189	938	143	127	100	217	47	120
Miscellaneous publications	.....	1,602	1,389	55	429	375	5	436	211
Form 105, sets	352	1,976	335	72	52	247	210	196	84
Vessels visited	2,121	3,674	1,208	1,755	296	509	409	603	461
Reports to Signal Service for Mascart cablegram	211	923	248	.....	.....	.....	.....	.....	.....

DIVISION OF CHART CONSTRUCTION.

The report of this division, which is in charge of Mr. G. W. Littlehales, embodies statistical accounts of the force employed and its distribution, of the progress made in the construction, correction, and publication of nautical charts, and of the present condition of the work; and statements of the investigations which have been made into the feasibility of adapting additional machines to the acceleration and improvement of the work of chart construction, and into the subjects of geographic positions, magnetic variations, and distances over sea routes.

THE FORCE EMPLOYED.

Throughout the year 6 draftsmen have been engaged in preparing new charts for publication and in revising and correcting charts on issue before printing; 1 draftsman in receiving and recording information and in charging it to the publications and geographic sect

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affected, and in the revision of new engraving; and 1 draftsman in plotting the charts resulting from the survey of the west coast of Lower California, between San Bartolomé Bay and Abreojos Point, by the officers of the U. S. S. *Ranger*, and in compiling the deep-sea sounding sheets of the Pacific Ocean; 11 engravers and 3 engraver's apprentices have been engaged in engraving new charts and in engraving corrections on charts on issue; 1 record clerk has been engaged in keeping the time of the employés and in compiling the records of construction and correction of charts; 4 printers, 1 printer's apprentice, and 1 laborer have been engaged in printing charts for issue; and 4 laborers have been employed respectively as custodian of information, messenger, night watchman, and plate-maker. For a part of the year 1 computer, 1 engraver, and 1 engraver's apprentice, who resigned their positions, were engaged respectively in compiling and computing data relating to terrestrial magnetism and distances over sea routes and in computing and laying down projections of new charts, in engraving the outlines and topography of new charts, and in engraving the soundings and general lettering of charts of special localities.

THE U. S. S. RANGER'S WORK.

The records of the survey of the west coast of Lower California, from San Bartolomé Bay to Abreojos Point, by the officers of the U. S. S. *Ranger*, during the season of 1889 and 1890, were received partly in December, 1890, and partly in January, 1891. The work upon the general plotting sheet had been commenced on board the *Ranger* by Lieut. O. W. Lowry, U. S. Navy, who had charge of the main triangulation and topography of the survey, and was finished here under his supervision, from the original records of the survey, by Mr. C. F. Petersen, draftsman. The plotting of the survey of the special localities embraced by Asuncion and San Roque bays, and by Abreojos Point and vicinity, upon separate sheets, on a scale of 4 inches to the nautical mile, was performed entirely in this Office.

GENERAL CHARTS.

A chart of the world showing the routes followed by full-powered steam vessels, and the distances in nautical miles over them, has been completed and issued; and a general chart of the West Indies with the Gulf of Mexico and Caribbean Sea, on a scale of 1.3 inches to the degree of longitude, is in the hands of the engraver.

GREAT CIRCLE-SAILING CHARTS.

From the alto plates of the present great circle-sailing charts, on the gnomonic projection, covering the North Atlantic, South Atlantic, North Pacific, South Pacific, and Indian oceans, plates have been made by the process of electrotyping for a series of charts embodying a new and simple method of measuring courses lately devised by Mr. Gustave Herrle, chief draftsman, and an additional method for measuring distances on great circles. The plate for the chart of the North Atlantic Ocean is in the hands of the engraver, and the drawings which have been prepared for the others of the series are ready for engraving.

GENERAL COAST CHARTS.

The series of general coast charts, on a scale of 4½ inches to the degree of longitude, has been extended by the completion of a chart of the west coast of Africa from Cape Juby to Cape Cantin, including

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Madeira and the Canaries. There are now in an advanced stage of construction five charts of this scale of contiguous portions of the coast of Asia, covering, respectively, the coast of China from Amoy to the mouth of the Yang-tse-Kiang; the coasts of China and Korea, including the gulfs of Peiho and Liautung; the Korean Strait, including the adjacent coasts of Japan and Korea; the coasts of Japan between the Bungo Channel and the Gulf of Tokyo on the south coast, and between Hamada and Noto Peninsula on the north; and the coasts of Japan between the Gulf of Tokyo and the Strait of Tsugaru on the east coast, and between Noto Peninsula and the Strait of Tsugaru on the west.

The Hydrographic Office series of general charts of the east coast of North America now embraces the extent from the Grand Banks of Newfoundland to Pernambuco, excepting the coast of Venezuela, concerning which there are not sufficient data to construct a reliable chart. The collection and discussion of the data for extending this series over the coasts of Brazil and Uruguay have been completed and three charts are in course of construction, covering, respectively, the portions of coast of Brazil between Pernambuco and Santa Cruz, Santa Cruz and Rio de Janeiro, and Rio de Janeiro and Rosario.

SPECIAL COAST CHARTS.

Charts of Gaspar Strait, East India Archipelago, and the east coast of Newfoundland from Cape Bonavista to Cape St. Mary, on a scale of one-fourth of an inch to the minute of middle latitude, have been completed.

The remaining chart of the series enveloping Newfoundland is ready for the engraver of lettering. The third of the series of special coast charts resulting from the survey of the west coast of Lower California by the officers of the U. S. S. *Ranger* is ready for engraving. It embraces the coast between Cerros Island and Abreojos Point.

SPECIAL CHARTS.

Charts of this system, on an average scale of 1 inch to the minute of middle latitude, covering special localities, have been published for Manila Bay, Philippine Islands; the Gut of Canso, Nova Scotia; Great and Little Bras d'Or Lakes with their approaches, Nova Scotia; the Maroni and Mana rivers, Guiana; Passamaquoddy Bay and approaches between Maine and New Brunswick; and the Island of St. Lucia, West Indies.

HARBOR CHARTS.

The work upon the plans of harbors, on large scales, as well as the work upon the more general charts, and also upon miscellaneous plates, is set forth in detail in the following tables:

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Charts engraved on copper, and published during the fiscal year ending June 30, 1891.

General locality.	Catalogue number.	Title.	Scale.	Size.	When begun.	When finished.
Mexico	1225	Laguna de Terminos, Western Entrance	M. = 2.0	14.5 x 18.5	Apr, 1890	Aug., 1890
Bahamas	1226	Wide opening	M. = 3.0	10 x 13	June, 1890	Aug., 1890
Mexico	1228	Laguna de Terminos, Puerto Real Entrance	M. = 4.0	19.5 x 24.5	May, 1890	Aug., 1890
Canada	1217	Caraquette, Shippegan, and Miscou harbors	M. = 1.5	25 x 39	July, 1888	Sept., 1890
Bahamas	1227	The Fleming, or Six Shilling Channel	M. = 1.0	10 x 11.8	June, 1890	Sept., 1890
Do.	1227	Ship Channel	M. = 3.0	10 x 11.8	June, 1890	Sept., 1890
Chile	1232	Concon Cove	M. = 2.0	10.7 x 13.6	July, 1890	Oct., 1890
Philippine Islands	1230	Manila Bay	M. = 0.5	22.1 x 32.5	Sept., 1889	Oct., 1890
Mexico	1233	Cay Arenas	M. = 3.0	10.5 x 11.5	Aug., 1890	Oct., 1890
Do.	1234	Arcas Cays	M. = 3.0	11.5 x 22.6	Aug., 1890	Oct., 1890
Do.	1235	Sisal Anchorage, and Sisal and Madagascar reefs	M. = 1.0	21.6 x 22.6	Aug., 1890	Oct., 1890
Island of Haiti	1231	Cape Haiti Harbor	M. = 4.0	17.8 x 23	June, 1890	Oct., 1890
Mexico	1229	La Paz Harbor	M. = 6.0	35.5 x 26	May, 1890	Nov., 1890
Canada	1236	Gut of Canso and Chedabuctou Bay	M. = 1.0	37 x 25.3	Nov., 1888	Nov., 1890
Do.	1237	Great and Little Bras D'Or lakes, with their approaches	M. = 0.75	34.5 x 30	Sept., 1888	Nov., 1890
Guiana	1238	Maroni and Mana rivers	M. = 1.0	33.9 x 24	Apr., 1890	Nov., 1890
Mexico	1239	Eastern and Southern	M. = 2.0	12 x 17	Oct., 1890	Dec., 1890
		Triangles and Obispo shoals, Yucatan	M. = 2.0			
Do.	1240	Alacran Reef, Yucatan	M. = 0.5	14 x 17.5	Aug., 1890	Dec., 1890
		Alacran Port, Yucatan	M. = 3.0			
Bahamas	1241	Egg Island to Eleuthera Island	M. = 2.0	21.7 x 24.7	June, 1890	Dec., 1891
Japan	1242	Yokohama Bay	M. = 4.0	19.3 x 25.8	July, 1890	Jan., 1890
Malay Peninsula	1243	Singapore Roads	M. = 6.0	35.9 x 23.9	May, 1889	Jan., 1891
Hawaiian Islands	1244	Harbors of Maui:				
		Kapueokahi (Hana Bay)	M. = 4.0			
		Mapili	M. = 4.0	11.3 x 14	Oct., 1890	Jan., 1881
		Makena Bay	M. = 4.0			
		Kahului Harbor	M. = 4.0			
Canada	1247	Passamaquoddy Bay and approaches	M. = 1.0	32 x 33	Mar., 1889	Jan., 1891
Chile	1249	Angomas Point and San Luciano anchorages	M. = 2.0	14.2 x 19.6	Dec., 1890	Feb., 1891
Marshall Islands	1248	Ebon Atoll	M. = 1.5	13.5 x 23.8	Nov., 1890	Feb., 1891
		Arne Atoll	M. = 0.5			
		Ine Anchorage	M. = 4.0			
West Indies	1245	Spanish Water, Spanish Haven, and Caracas Bay	1.000 yds. = 10.0	24.7 x 28.5	Aug., 1890	Feb., 1891
Guatemala	1250	Port Livingston	M. = 3.0	11.9 x 17.7	Jan., 1891	Feb., 1891
Africa	1246	West Coast of Africa, from Cape Juby to Cape Cantin, with Madeira and the Canaries.	D. long. = 4.5	31.3 x 43	Feb., 1890	Feb. 1891
Hawaiian Islands	1251	Harbor of Kauai:				
		Hanalei Bay	M. = 4.0	13.5 x 28.1	Nov., 1890	Mar., 1891
		Waimea Bay	M. = 6.0			
		Hanamaulu Bay	M. = 4.0			
		Nawiliwili Harbor	M. = 4.0			

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Charts engraved on copper and published during the fiscal year ending June 30, 1891—Continued.

General locality.	Catalogue number.	Title.	Scale.	Size.	When begun.	When finished.
		Harbors of Oahu:				
		Waimea Bay	M. = 8.0	18.6 x 19.1		
		Wailua Bay	M. = 6.0			
Hawaiian Islands	1252	Barbers Point	M. = 4.0		Nov., 1890	Mar., 1891
		Laie Bay	M. = 4.0			
		Harbors of Hawaii:				
		Kawaihae Bay	M. = 4.0			
		Kailua Bay	M. = 4.0	19.1 x 28.1		
Do	1257	Keauhou Bay	1,000 yds. = 6.0		Nov., 1890	Mar., 1891
		Kealakekua Bay	M. = 4.0			
Newfoundland	1102	East Coast of Newfoundland, Cape Bonavista to Cape St. Marys	D. lat. =14.7	25 x 40.2	May, 1887	Mar., 1891
The World	A	Index to General Charts	D. long. = 0.075	8.6 x 15.0	July, 1890	Mar., 1891
South America	N	Index to Coast, Harbor, and Special Charts of the Northern Part of South America.	D. long. = 0.3	10.5 x 16.5	Oct., 1890	Mar., 1891
Do	O	Index to the Coast, Harbor, and Special Charts of the Central Part of South America.	D. long. = 0.3	10.3 x 16.4	Oct., 1890	Mar., 1891
Do	P	Index to the Coast, Harbor, and Special Charts of the Southern Part of South America.	D. long. = 0.3	10.5 x 16.5	Oct., 1890	Mar., 1891
		Habors on the coast of Chile		20.3 x 26		
		Queule Bay	M. = 3.0	4. x 5.5		
		River Tolten	M. = 3.0	5.3 x 9.8		
		Port Quidico (Nena)	M. = 1.5	4.2 x 4.2		
		Topocalma Road and Tumas Bay	M. = 1.5	5.3 x 9.8		
		Ligua Bay	M. = 2.0	6.5 x 7.4		
		Totoralillo Bay	M. = 2.0	3.8 x 6.5		
		Choros Bay	M. = 3.0	3.6 x 4.1		
		Apolillado Cove	M. = 4.0	3.6 x 4.1		
		Chañaral and Gaviota bays	M. = 1.5	5 x 5.8		
Chile	1253	Peña Blanca Cove	1,000 yds. = 5.0	5 x 5	Aug., 1890	Mar., 1891
		Herradura de Carrizal	M. = 4.0	3.6 x 7		
		Port Carrizal Bajo	1,000 yds. = 4.0	4 x 6.1		
		Chañaral de las Animas	M. = 1.0	4 x 4.4		
		Port Taltal	M. = 1.5	3.8 x 4.1		
		Paposo Road	M. = 3.0	3.6 x 3.6		
		El Cobre Cove	M. = 3.0	3.6 x 5.5		
		Chimba Bay	1,000 yds. = 2.0	3.3 x 5.5		
		Constitucion Harbor	M. = 1.0	3.8 x 5.5		
		Chipana Bay	M. = 2.0	4 x 5.5		
		Huaina Pisagua Bay	M. = 2.0	5.5 x 6.6		
China	1254	Hongkong Harbor	M. =12.0	26.9 x 35.8	June, 1890	Mar., 1891
Do	1256	Kelung Harbor	M. = 3.0	24 x 24	Aug., 1890	Mar., 1891
Do	1255	Shanghai Harbor	1,000 yds. = 5.0	24.8 x 32.8	Nov., 1890	Apr., 1891

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		Islands of the Caroline Group		19.7 x 20.2		
		Plans of—				
		Los Martires	M. = 0.5	7 x 8.1	Jan., 1891	Apr., 1891
North Pacific Ocean	1258	Satawal Island	M. = 0.5	5.1 x 8.1		
		Yap Island	M. = 0.25	6 x 8.1		
		Ulie Islands	M. = 3.0	11 x 19.2		
		Harbors on the coast of Chile:				
		Algodonales Bay	M. = 2.0	13.4 x 19.9		
		Pajonal Cove	M. = 2.0	4.6 x 6.3		
Chile	1259	Maitencillo Cove	M. = 4.0	3.0 x 6.3	Feb., 1891	Apr., 1891
		Port Copiapo	M. = 1.0	4.6 x 6.3		
		Pichidanqui Bay	M. = 2.0	6.3 x 1.3		
		San Pedro Bay		6.3 x 6.3		
West Indies	1261	Island of St. Lucia	M. = 1.0	9.4 x 38	Apr., 1890	Apr., 1891
Korea	1263	Monocacy Anchorage, Crichton Group	M. = 4.0	8.3 x 9.5	May, 1891	May, 1891
Hawaiian Islands	1264	Port Waianæ, Oahu	M. = 4.0	15.8 x 20.5	Feb., 1891	May, 1891
Chile	1265	Tocopilla (Algodonales) Road	M. = 3.0	10.4 x 15.1	Apr., 1891	May, 1891
North Pacific Ocean	1260	Palao (Pelew) Islands	M. = 0.25	15.8 x 22.1	Jan., 1891	May, 1891
		Korror Harbor	M. = 1.0	4.2 x 28.2		
East India Archipelago	1266	Gaspar Strait	M. = 0.25	18.8 x 28.2	Mar., 1890	May, 1891
		Islands off the coast of Chile		13.7 x 25.3		
		Juan Fernandez Island (Masa Tierra)	M. = 0.5	6.6 x 7.1		
Chile	1267	San Juan Bautista, or Cumberland Bay, Juan Fernandez Island.	M. = 4.0	13.2 x 13.3	Dec., 1890	May, 1891
		Mas Afuera Island	M. = 0.25	8.5 x 6.6		
		St. Ambrose and St. Felix Islands	M. = 0.5	6.2 x 11.1		
West Coast Lower Cal.	1268	Asuncion and San Roque bays	M. = 2.0	23.8 x 25.7	Mar., 1891	May, 1891
Island of Haiti	1269	Port Cabaret, Santo Domingo	M. = 8.0	10.5 x 11.1	Apr., 1891	May, 1891
Japan	1270	Nagasaki Harbor	M. = 3.0	26.7 x 31.9	Nov., 1890	May, 1891
		Approaches to the Dry Dock	1,000 yds = 0.75	4.9 x 4.5		
Dutch Guiana	1271	Surinam River	M. = 2.0	23.2 x 32	Sept., 1890	June, 1891
Chile	1273	Blanco Encalada Cove	M. = 4.0	10.2 x 12.5	May, 1891	June, 1891
	1262	Chart of the World, showing tracks followed by full-powered steam vessels.	10° Long. = 1.2	27.1 x 47.5	Apr., 1891	June, 1891
Caroline Group	1274	Chabrol Harbor, Ualan Island	M. = 8.0	14.9 x 10.8	May, 1891	June, 1891
Madeira Islands	1275	Porto Santo Bay	M. = 2.0	13.4 x 18.1	Apr., 1891	June, 1891
Brazil	1276	Port Macelo	M. = 4.0	10.7 x 13.2	June, 1891	June, 1891

NOTE.—The scale of the chart is expressed in inches by the use of the abbreviations D. long., the length of a degree of longitude on the equator; D. lat., the length of a degree of the meridian in the middle latitude of the chart; and M, the length of a nautical mile. The size of the chart is expressed in inches, measuring between the extreme edges of the border.

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Charts which have received important corrections and additions amounting to a redrawing of a portion of the chart.

General locality.	Catalogue number.	Title.	Character of corrections.
Gulf of Mexico	1125	Gulf coast of the United States.	Corrections and additions to lights, buoys, and wrecks; numerous additions of soundings.
China Sea	799	China Sea; southern portion; eastern sheet.	Numerous corrections of reefs, rocks, and dangers in position and depth, and correction of coast line in several places, and additions of soundings.
Japan	549h	Secto Uchi or Inland Sea, Sheet II.	Numerous corrections in the coast line, soundings, and topography.
East Indian Archipelago	1142	Sunda Straits and approaches.	Correction of soundings, dangers, buoys, lights, and names. Addition of plan of New Anjer.
Hawaii	6	Honolulu Harbor	Extensive corrections in the hydrography at the entrance and of topography around the town.
Mediterranean Sea	282	Mediterranean Sea, middle sheet.	Numerous additions and changes in lights; corrections to hydrography.
Do	283	Mediterranean Sea, eastern sheet.	Numerous additions and changes in lights; corrections to hydrography.
Gulf of Mexico	1126	Gulf coast of the United States.	New hydrography in Atchafalaya, Vermillion, and Cote Blanche bays, and the approaches to the same.
Nicaragua	1186	Greytown Harbor	Extensive changes at western end of harbor, showing harbor works in progress, with preliminary channel across bar, plan of the new city of America.
Newfoundland	794	Canada Bay and plans of various harbors.	Extensive corrections to shore line and hydrography at the head of Canada Bay.
Arctic Ocean	68	Bering Sea	Changes in shore line and hydrography, chiefly in the vicinity of Jamakaia Bay, Gichigiak Bay, and Gulf of Panchinak.
Hawaiian Islands	867	South side of Oahu	The addition of hydrography and topography of the east coast, including Kaneohe passage and bay.
East Indian Archipelago	1170	Western part of Java Sea and southern passage to China.	Plan of Flying Fish Cove and Christmas Island.
South America	1177	Cape San Francisco to Lobos de Afuera Islands.	Numerous corrections to coast line.
Cuba	520b	Port Mariel and Bahia Honda.	Extensive changes in entrance to Bahia Honda.
South Pacific Ocean	825a	South Pacific Ocean, western middle sheet, upper part.	Numerous slight changes in geographic positions; and extensive additions, chiefly deep sea soundings.
North Atlantic Ocean	21a	North Atlantic Ocean, western sheet, upper part.	New hydrography and topography in Hudson Bay, chiefly in James Bay.
South Pacific Ocean	826a	South Pacific Ocean, western sheet, upper part.	Extensive and numerous changes in hydrography.
North Pacific Ocean	529	North Pacific Ocean, western sheet.	Extensive and numerous changes in hydrography, chiefly additional deep-sea soundings.
Newfoundland	1104	West and south coasts of Newfoundland; Bonne Bay to Burgeo Island.	Entirely new hydrography and topography from La Porte Bay to Burgeo Island, from a recent survey.
West Indies	1165	Port Castries, St. Lucia	Removal of shoals, shifting of buoys, and changes in shore line.
New Brunswick	1054	L'Etang Harbor	Extensive changes in hydrography and topography, largely additional.
West coast British America.	903	Juan de Fuca Strait to Queen Charlotte Sound, including Vancouver Island.	Changes in shore line and hydrography in the vicinity of Cape Flattery, and small corrections in other localities.
Ecuador	1122	Caraquez River	Addition of about 4 inches to the upper limits of the chart and reproduction of the entrance from a new survey, with very extensive changes in the hydrography.
North Pacific Ocean	528	North Pacific Ocean; eastern middle sheet.	Changes and corrections of outlines and positions in the Marshall and Caroline groups; additions of dangers in the Aleutian Islands; and soundings in Bering Sea near the Pribiloff Islands.

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Charts which have received important corrections and additions, etc.—Continued.

General locality.	Catalogue number.	Title.	Character of corrections.
North Atlantic Ocean	22	North Atlantic Ocean; eastern sheet, lower half.	Addition of deep sea soundings off the west coast of Africa, near the Canaries and Cape Verde Islands.
Pacific Ocean	121	Phœnix Group	Important changes in the geographical positions of nearly all the islands of the group, and considerable changes in outlines of several islands.
China	929	Hongkong Harbor and approaches.	Extensive changes in topography and hydrography, chiefly in the harbor of Hongkong and on the Kaulung (Kowloon) Peninsula and its shores.
Canada	1112	River St. Lawrence, Saguenay River to Quebec.	Extensive and important corrections, chiefly in hydrography in and near the Traverses, with a few corrections in other parts of the chart.
Pacific Ocean	1211	Phœnix and Canton Islands, with Canton Island anchorage.	Entirely redrawn and engraved from the survey by the officers of H. M. S. Egeria in 1889.
South America	452a	Ports in the Straits of Magellan.	New hydrography and topography in Cordes Bay and on plan of Cape San Isidro to Glascott Point.
West Indies	977	Harbor of St. Thomas	New hydrography and topography in Careening Cove.

Chart plates electrotyped during the fiscal year.

General locality.	No.	Title.	Kind of plate made.	Size.	When finished.
Ecuador	1122	Caraquez River	Alto	19½ x 20	Nov., 1890
Do	1122	do	Basso	19½ x 20	Nov., 1890
Peru and Chile	1218	Pisco to Arica	Alto	34 x 44	Nov., 1890
North Atlantic Ocean	1070	North Atlantic	do	40 x 41	Nov., 1890
Central America	1120	Gulf of Honduras	do	28½ x 35½	Nov., 1890
Lower California	1193	San Quentin Bay to Cerros Island	do	33 x 40	Mar., 1891
East Indies	1205	Singapore and Rhio Straits	do	33½ x 40	Mar., 1891
East India Archipelago	1206	New Harbor, Singapore	do	16½ x 23	Mar., 1891
Canada	1237	Great and Little Brae D'Or Lakes	do	32½ x 36½	Mar., 1891
Do	1207	Quebec Harbor	do	28 x 38	Mar., 1891
Java	1188	Approaches to Batavia	do	30½ x 42½	May, 1891
Lower California	1149	San Diego to San Quentin Bay	do	35 x 44	May, 1891
Portugal	1208	Approaches to the Tagus River and the harbor of Lisbon.	do	36 x 37½	May, 1891
Azores	1224	Fayal Channel with Horta and Pim Bays.	do	28 x 22	May, 1891
Japan	1242	Yokohama Bay	do	23 x 29	May, 1891
Canada	1236	Gut of Canso	do	28½ x 38½	May, 1891
North Pacific Ocean	1127	Great Circle sailing chart of the North Pacific Ocean.	Basso	31 x 40½	June, 1891
South Pacific	1128	Great Circle sailing chart of South Pacific Ocean.	do	31 x 40½	June, 1891
North Atlantic	994	Great Circle sailing chart of the North Atlantic Ocean.	Alto	29½ x 41½	June, 1891
Do	994	Great Circle sailing chart of the North Atlantic Ocean.	Basso	29½ x 41½	June, 1891
Indian Ocean	1129	Great Circle sailing chart of the Indian Ocean.	do	30 x 41½	June, 1891
South Atlantic	995	Great Circle sailing chart of the South Atlantic Ocean.	do	29½ x 40½	June, 1891

PLATE-MAKING AND PRINTING.

Thirty-one blank plates were purchased, and 26 were made by scouring down and polishing condemned plates on which the engraving had become obsolete. Two engraved plates were withdrawn from use. The number of copper and steel chart-plates available for printing charts is

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626. From these were printed 28,656 copies for issue and 677 proofs for office use. There are also 106 miscellaneous engraved plates, from which 1,647 copies were printed. The total number of accepted copies of plates printed is 30,293. In addition the force of printers was employed in miscellaneous printing and stamping as follows:

Official letter paper	reams..	14½
Official note paper	do....	16½
Official envelopes		21,667
Official cards		900

Summary.

	Total to June 30, 1890.	Finished during the year.	Withdrawn during the year.	Total to June 30, 1891.
Engraved chart-plates	571	57	2	626
Miscellaneous plates	105	1	.....	106
Altos of engraved chart-plates	149	16	.....	165
Bassos of engraved chart-plates	73	6	.....	79
Impressions of engraved plates for use	.....	.....	.....	30,293
Proof of engraved plates for office use	.....	.....	.....	677

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Charts in process of construction unfinished at the close of the fiscal year.

General locality.	Catalogue number.	Preliminary title.	Scale.	Size.	When begun.	Remarks.
Newfoundland	50*p*	Northeast Newfoundland	D. lat. =15.0	24 x 39.5	Dec., 1887	Ready for engraver of lettering.
Canada	101*p*	Madame Island and Lennox Passage	M. = 2.0	25 x 38	Sept., 1888	Will be published in July, 1891.
Ecuador	107*p*	Guayaquil River	M. = 0.5	24 x 41	Nov., 1888	Awaiting data for completion of drawing.
Lower California	168*p*	Lagoon head to San Bartolome Bay	D. long. =15.0	28.8 x 39	Apr., 1890	Ready for engraver of topography.
Japan	176*p*	Yokohama to Bungo Channel	D. long. = 4.5	32.1 x 45	May, 1890	Ready for engraver of lettering.
Do	177*p*	The Strait of Korea with the adjacent coasts of Japan and Korea.	D. long. = 4.5	29.2 x 45.2	June, 1890	In hands of engraver of lettering.
Do	175*p*	The Strait of Tsugaru to Yokohama	D. long. = 4.5	28.7 x 45.3	June, 1890	In hands of engraver of topography.
Do	203*p*	Gulf of Tokyo	M. = 0.75	26.5 x 39.2	May, 1890	In hands of engraver of lettering.
China	180*p*	The gulfs of Pechili and Liautung	D. long. = 4.5	27.8 x 44.8	July, 1890	Ready for engraver of lettering.
West Indies	209*p*	The island of Grenada	M. = 1.0	22.5 x 38.9	July, 1890	In hands of engraver of outlines.
Do	220*p*	Island of St. Vincent	M. = 1.0	20.4 x 28.8	Oct., 1890	On hands of engraver of lettering.
China	232*p*	Amoy Harbor and approaches	M. = 1.0	31 x 37.7	Dec., 1891	In hands of engraver of outlines.
Colombia	238*p*	Chiriqui Lagoon	M. = 1.0	35.4 x 54	Feb., 1891	Drawing being revised.
North America	239*p*	Nanaimo Harbor	M. = 4.0	18.7 x 26	....do	In hands of engraver of lettering.
China	240*p*	Amoy Inner Harbor	M. = 6.0	21.2 x 27.8	....do	Do.
North America	241*p*	Esquimalt and Victoria harbors	M. = 4.0	26 x 36.8	....do ...	Ready for engraver of lettering.
West Indies	242*p*	Gulf of Mexico and the Caribbean Sea	D. long. = 1.3	11.4 x 32.4	Mar., 1891	Drawing being revised.
Madeira Island	243*p*	Funcha Harbor	M. =10.0	18 x 22.4	Mar., 1890	In hands of engraver of lettering.
Haiti	247*p*	Monte Christi to Fort Dauphin Bay	M. = 1.5	24.5 x 31	Apr., 1891	Ready for engraving.
Gulf of Mexico	249*p*	Bay of Campeche	M. = .04	27.2 x 40.2	May, 1891	Do.
Lower California	252*p*	Abreojos Point Anchorage and vicinity	M. = 2.0	24.4 x 26.5	.. do	Do.
Brazil	253*p*	Pernambuco to Santa Cruz	D. long. = 4.5	28 x 43	June, 1891	In hands of draftsman.
Do	256*p*	Santa Cruz to Rio de Janeiro	D. long. = 4.5	.....	....do	Do.
Madeira	257*p*	Madeira, Porto Santo, and Dezertas islands	M. = 0.5	27.2 x 31	....do	Ready for engraving.
Central America	258*p*	Blewfield Lagoon	M. = 8.0	20.4 x 25.5	....do	Do.
South America	259*p*	Port La Plata	M. = 3.0	.....	....do	In hands of draftsman.

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Charts receiving important corrections and additions unfinished at the close of the fiscal year.

General locality.	No.	Title.	Character of correction.
Japan	549a	Seto Uchi, or inland sea; western part. Sheet I.	Extensive correction in coast line, hydrography and topography from recent surveys.
North Atlantic Ocean	22a	North Atlantic Ocean; Sheet II. Eastern part; upper sheet.	Extensive correction in lights. Coast of Greenland reëngraved.
New Brunswick	149	St. John, New Brunswick. Enlarged plan of the entrance to the harbor.	Extensive correction in hydrography.
Newfoundland	581b	Newfoundland; southern portion.	Extensive correction in coast line, hydrography and topography.
Cuba	307	Havana Harbor	New hydrographic survey.

MAGNETIC VARIATIONS.

The construction of a chart of the lines of equal magnetic variation for the coasts of China and the East was begun in connection with the current work upon the charts of the coast of China and Japan which are being prepared. On account of the lack of magnetic observations at sea, it has not yet been found possible to extend the lines beyond the immediate coast. As the number of observations sent in by naval vessels is greatly insufficient for this purpose, a form for the collection of observations was prepared and circulated among masters in the mercantile marine with a view of deriving the data from this source.

The record of magnetic observations at shore stations has received important additions from the work of the United States eclipse expedition to the west coast of Africa in 1889 and 1890, and from the magnetic observations made by Lieut. Charles Laird and Ensigns J. H. L. Holcombe and L. M. Garrett, U. S. Navy, of the expedition for the telegraphic determination of longitudes in Mexico, Central America, the West Indies, and the north coast of South America in 1888, 1889, and 1890. The observations of the latter expedition were computed and prepared for publication in this Division, and appear as an appendix to Hydrographic Office publication No. 97.

The lists of observations, extending generally from the beginning of the seventeenth century to the present time, have become sufficiently extensive at the following-named stations to warrant the deduction of empirical equations for predicting values of the variation and assigning rates of secular change. In these equations, V represents the variation for any time, and T the time expressed in years and fractions of a year counted from 1850, plus when forward and minus when backward.

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General locality.	Name of place.	Equation giving variation for any year.	Prob. error of vals. computed from this equ.	Variation for 1891.
		°	′	°
California	San Diego	$V = -11.847 - 1.099 \sin \frac{3}{4} t - 0.758 \cos \frac{3}{4} t$	±11	13.17 E.
Mexico	Lagoon Head	$V = -9.845 - 1.289 \sin \frac{1}{2}^{o} t - 1.519 \cos \frac{1}{2}^{o} t$	±09	11.74 E.
Do	Magdalena Bay	$V = -7.484 - 1.469 \sin \frac{1}{2}^{o} t - 2.739 \cos \frac{1}{2}^{o} t$	±35	10.16 E.
Do	San Blas	$V = -6.597 - 0.558 \sin \frac{1}{2}^{o} t - 2.761 \cos \frac{1}{2}^{o} t$	±26	8.51 E.
Do	City of Mexico	$V = -5.522 + 0.027 \sin t - 3.088 \cos t$	±14	7.88 E.
Do	Vera Cruz	$V = -4.768 + 0.608 \sin t - 3.860 \cos t$	±29	7.28 E.
West Indies	Havana	$V = -4.25 + 2.74 \sin (1.25 t - 23.3)$	±29	2.96 E.
Do	Bridgetown	$V = -2.079 + 1.737 \sin \frac{1}{2} t + 1.300 \cos \frac{1}{2} t$	±16	0.09 W.
Do	Fort de France	$V = -2.726 + 2.926 \sin \frac{1}{2} t + 1.528 \cos \frac{1}{2} t$	±19	0 42 W.
Do	Curaçao	$V = -4.674 + 2.595 \sin t + 0.777 \cos t$	±07	2.88 E.
Venezuela	La Guayra	$V = -3.489 + 1.585 \sin t + 0.042 \cos t$	±15	2.42 E.
Brazil	Maranham	$V = +2.107 + 0.0728 t - 0.0601 t^2$	±55	4.92 W.
Do	Pernambuco	$V = +9.652 + 9.6 \sin \frac{8}{10} t - 1.245 \cos \frac{8}{10} t$	±06	14. 42 W.
Do	Bahia	$V = -0.471 + 8.150 \sin \frac{1}{2} t + 7.424 \cos \frac{1}{2} t$	±28	10.42 W.
Do	Rio de Janeiro	$V = +1.814 + 8.655 \sin t - 1.825 \cos t$	±25	6.11 W
Uruguay	Montevideo	$V = -10.261 + 3.887 \sin t - 0.152 \cos t$	±12	7. 83 E.
Argentine Republic.	Buenos Ayres	$V = -12.332 + 3 448 \sin t + 0.611 \cos t$	±38	9.31 E.
Patagonia	Punta Arenas and Port Famine.	$V = -20.184 + 2.002 \sin t - 2.372 \cos t$	±07	20.66 E.
Chile	Concepcion	$V = -11.940 - 0.765 \sin \frac{3}{4} t - 4.938 \cos \frac{3}{4} t$	±22	16.57 E.
Do	Valparaiso	$V = -12.639 + 0.047 \sin t - 3.124 \cos t$	±18	14.97 E.
Do	Coquimbo	$V = -11.965 - 0.656 \sin \frac{1}{12} t - 2.645 \cos \frac{1}{12} t$	±21	14.19 E.
Do	Arica	$V = -9.401 + 0.300 \sin \frac{3}{4} t - 1.442 \cos \frac{3}{4} t$	±06	9.82 E.
Peru	Callao	$V = -8.654 + 0.264 \sin \frac{3}{4} t - 1.712 \cos \frac{3}{4} t$	±10	9.95 E.
Do	Paita	$V = -4.404 + 0.384 \sin \frac{3}{4} t - 4.692 \cos \frac{3}{4} t$	±06	8.14 E.
Ecuador	Puña and Guayaquil.	$V = -8.459 + 0.0204 t + 0.0001 t^2$	±10	7.46 E.
Colombia	Panama	$V = -6.540 + 1.367 \sin \frac{1}{12} t + 0.105 \cos \frac{1}{12} t$	±13	5.20 E.
Do	Cartagena	$V = -3.268 + 3 566 \sin \frac{8}{10} t - 1.818 \cos \frac{8}{10} t$	±19	3.44 E.
Pacific Ocean	Galapagos Islands	$V = -7.491 + 0.089 \sin \frac{1}{12} t - 1.910 \cos \frac{1}{12} t$	±26	8.34 E.
Do	Tahiti	$V = -5.640 - 0 \text{ 288} \sin t - 1.7697 \cos t$	±14	7.52 E.
Australia	Sydney	$V = -8.119 - 0.3239 \sin 1.112 t - 1.5765 \cos 1.112 t$	±12	9.45 E.
New Zealand	Auckland	$V = -13.077 + 0.2295 \sin \frac{1}{12} t - 1.0526 \cos \frac{1}{12} t$	±10	13.66 E.
Philippine Isl'ds.	Manila	$V = -0.2233 - 0.3997 \sin t - 0.4184 \cos t$	±08	0.08 E.
Malay Peninsula	Singapore	$V = +0.24 - 1.18 \sin \frac{8}{10} t - 2.431 \cos \frac{8}{10} t$	±17	2.41 E.
Java	Batavia	$V = +1.494 - 1.194 \sin \frac{8}{10} t - 2.928 \cos \frac{8}{10} t$	±15	1.56 E.
Do	Surabaya	$V = +2.744 - 2.706 \sin \frac{8}{10} t - 3.832 \cos \frac{8}{10} t$	±05	1.94 E
China	Hongkong	$V = +0.990 + 0.3c9 \sin \frac{8}{10} t - 2.047 \cos \frac{8}{10} t$	±15	0.52 E.
Do	Shanghai	$V = +1.9084 - 0.000012 t + 0.000149 t^2$	.....	2.16 W.
Do	Pekin	$V = +2.179 + 0.0131 t + 0.000 117 t^2$	±06	2.91 W.
Japan	Nagasaki	$V = +2.945 + 0.02302 t + 0.0000303 t^2$	±14	3.94 W.
Nova Scotia	Halifax	$V = +16.74 + 3.32 \sin \frac{11}{12} t + 2.74 \cos \frac{11}{12} t$	±26	21 00 W.
Prince Edward Island.	Charlottetown	$V = +15.15 + 1.714 \sin \frac{1}{12} t + 7.766 \cos \frac{1}{12} t$	±20	22.27 W.
Newfoundland	St. Johns	$V = +15.634 + 4.8 \sin t + 14.76 \cos t$	±17	29.98 W.
Africa	Cape of Good Hope	$V = +14.63 + 3.178 \sin 0.61 t + 14.659 \cos 0.61 t$	.....	29.25 W.
Atlantic Ocean	Bermudas	$V = +7.08 + 0.0202 t$	.....	7.91 W.
Do	Ascension	$V = +20.34 + 0.142 t - 0.0020 t^2$	.....	22.82 W.
Do	St. Helena	$V = +8.90 + 6.446 \sin 0.618 t + 13.887 \cos 0.618 t$	.....	24.21 W.
Do	St. Vincent (Cape Verde Islands)	$V = +10.51 + 7.388 \sin 0.59 t + 7.134 \cos 0.59 t$	.....	20.04 W.
Do	Fayal (Azores)	$V = +12.43 + 0.366 \sin 0.75 t + 14.965 \cos 0.75 t$	.....	25. 47 W.

GEOGRAPHIC POSITIONS.

The compilation of the record of geographic positions has been continued. The number of reliable longitudes in this work has been much extended through the positions determined in the recent survey of the coast of China between Amoy and the mouth of the Yangtsekiang with reference to the meridians of Shanghai and Amoy as determined telegraphically in 1881 and 1882 by Lieut. Commanders Green and Davis, and Lieuts. Norris and Laird; and through the telegraphic determination of the meridians of Coatzacoalcos and Salina Cruz, Mexico; San Juan de Sur, Nicaragua; St. Nicolas Môle, Port Plata, and Santo Domingo, Island of Haiti; Santa Ana, Curaçoa; La Guayra, Venezuela; and Port Nolloth, Mossamedes, Benguela, St. Paul de Loanda, São Thomé, and Bonny, west coast of Africa.

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DISTANCES.

The work of computing and recording distances between the important ports of the world has been continued. Throughout the year distances have been supplied to committees of Congress and to the various bureaus of the Government.

It has been customary to give the shortest navigable distance unless special routes were designated. A chart showing the distances over the routes followed by full-powered steam vessels has been published.

DEEP SEA SOUNDINGS.

All reliable deep sea soundings which have been observed in the South Pacific Ocean have been plotted on fifteen sounding sheets constructed on a scale of 1½ inches to the degree of longitude. The work of bringing the sounding sheets of the North and South Atlantic and North Pacific oceans up to date is in progress, and the compilation of a detailed record of deep sea soundings has been continued.

The investigation referred to in the last annual report as having been undertaken to establish the maximum distance apart at which soundings should be taken to develop the existence of submerged dangers in the open ocean has been completed and issued as Hydrographic Office publication No. 95. The conclusion reached is that an interval of 10 miles coupled with an interval of 2 miles would be sufficient for general development, and would prove with certainty the existence or absence of any formation rising close to the surface.

MACHINES.

There is some prospect that the office will soon be enabled to take a long step forward in the engraving of charts. It has been demonstrated in the chart of Shanghai, lately published by this office, that the figures expressing soundings can be neatly and durably engraved by a machine, with great rapidity and at about one-fourth the present cost.

An improved power-worked plate-printing press is being built according to specifications furnished by this office.

A radial arm routing machine has been ordered for use in rapidly removing large areas of obsolete engraving from alto and basso chart plates.

Provision has been made for the installation of an electric motor to run the printing press and the routing machine.

A paper-cutting machine is much needed. The amount of time consumed in cutting paper for the large number of charts printed in this Division, by means of a straight edge and a shoemaker's knife, is enormous; besides the process results in bad work.

The new compass-rose which appears on the later charts has elicited favorable opinions from those who make practical use of them. It consists of a true and a magnetic system, each graduated to degrees and to quarter points, and affords ready and accurate means for mechanically resolving true into magnetic bearings or courses, whether expressed in degrees or points. It seems that if this figure is readily understood it should work considerable advantage, as courses and bearings have generally been expressed as *true* in the Sailing Directions, and as the directions of lines of bearing, track lines, and limiting lines of light sectors are reckoned from the true north both on the charts of this Office and on those of the Coast and Geodetic Survey, whereas mariners in general are accustomed to the process of convert-

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ing magnetic into compass bearings and courses and the reverse, and, therefore, require some ready means of arriving at the magnetic bearing for ordinary use.

DIVISION OF SAILING DIRECTIONS.

Lieut. R. G. Davenport relieved Lieut. Charles M. McCarteney, in charge of this division, in April last. The services of Lieut. McCarteney have been exceedingly valuable, and I regret his inability to remain longer.

The duties of this division are to keep on hand at least five corrected copies of each one of the ninety-six sailing directions issued by this office to vessels of war; to fill orders from agents and miscellaneous sources; to fit out with nautical books United States vessels, and to supply them with the latest editions of Sailing Directions and Light Lists corrected to date; to overhaul and translate foreign Notices to Mariners; to examine all books and documents likely to contain information necessary in compiling Hydrographic Office Notices to Mariners and the extracts which are published weekly; to keep up to date the standard Light Lists, and ready for the printer corrected copies of each of the six Light Lists; to keep in order and to supply promptly the demands for archive charts and documents, overhauling foreign chart catalogues in order that the latest published charts may be obtained for reference and use in the archives; also to keep corrected all archive charts referred to in the weekly Notices to Mariners; to index, overhaul, and place in the archives all original surveys and documents relating to hydrography and the work of this office, which are sent in from the various ships in commission, United States consuls, branch hydrographic offices, and others; to supply all divisions of the Hydrographic Office with new information as soon as it is indexed, and with archive books, documents, and charts, when required.

There have been catalogued and placed on the shelves one hundred and eleven new books of reference, besides serial publications relating to hydrography. All publications relating to meteorology, after being catalogued in this division, are transferred to the Division of Marine Meteorology. Much hydrographic and kindred information was furnished to various persons, public and private, relating to ports in most of the countries of the world. In addition to routine duties, the compilation of new sailing directions, supplements to old editions and the revision of old editions, has been steadily proceeded with, as shown in the following statement.

The following publications were placed on issue:

H. O. No. 64. Caribbean Sea and Gulf of Mexico, Vol. II.
H. O. No. 9. Bowditch Navigator, edition of 1890.
H. O. No. 95. The Average Form of Isolated Submarine Peaks.
H. O. No. 87. The International Signal Code, edition of 1890.
H. O. No. 96. The Coast of British Columbia, including the Juan de Fuca Strait, Puget Sound, Vancouver and Queen Charlotte Islands.
H. O. No. 30. List of Lights of the World, Vol. I, East and West Coasts of North and South America (except the United States).

Supplements to the following Sailing Directions were prepared and placed on issue, as also were sheet corrections for various sailing directions other than those published by this office:

Carribean Sea and Gulf of Mexico, Vol. I, H. O. No. 86.
The Northwest and West Coasts of Spain and the Coast of Portugal, H. O. No. 52.
The Coasts and Islands of the Mediterranean, Part I. H. O. No. 37.
The Coasts and Islands of the Mediterranean, Part IV, H. O. No. 68.

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The Coasts and Islands of the Mediterranean, Part II, H. O. No. 38.
Sailing Directions for the Indian Ocean, H. O. No. 85.
Light List, Vol. IV, Atlantic Coast of Europe, H. O. No. 33.
The West Coast of Mexico and Central America, H. O. No. 84.
The East Coast of South America, H. O. No. 88.
Caribbean Sea and Gulf of Mexico, Vol. II, H. O. No. 64.

The following were prepared and are in the hands of the printer:

H. O. No. 97. Report of the Telegraphic Determinations of Longitude in Mexico, Central and South America, and the West Indies.
H. O. No. 98. Report on Uniform System for Spelling Foreign Geographic Names.
Catalogue of plans, charts, sailing directions, and other publications of the United States Hydrographic Office for 1891.

The following were prepared and are ready for printing:

Sailing Directions:
- Nova Scotia and Bay of Fundy.
- Gulf and River of St. Lawrence.
- The Azores, Madeira and Cape Verde islands.

Supplements:
- Newfoundland and Labrador, H. O. No. 73.
- Reported Dangers to Navigation in the North Pacific, H. O. No. 41.
- Reported Dangers to Navigation in the North Pacific, H. O. No. 41a.
- A new edition of the six volumes of the List of Lights of the World and various sheet corrections for sailing directions other than those published by the Hydrographic Office.

Sailing Directions in preparation:
- The East Coast of Asia, Vol. I.
- The West Coast of Africa, Vol. I (to include the Azores, Madeira, Canaries and Cape Verde islands).
- Caribbean Sea and Gulf of Mexico, Vol. I (new edition of H. O. No. 86.

The following Sailing Directions were withdrawn from issue, being canceled by the publication of H. O. Nos. 96, 64, and 30:

British Columbia Pilot, British admiralty.
Caribbean Sea and Gulf of Mexico, Vol. II, H. O. edition of 1885.
Light list No. 1, coast of North and South America, H. O. edition of 1888.

The following new publications were received and issued to ships, and all publications canceled by them were withdrawn.

From U. S. Coast and Geodetic Survey:
- Pacific Coast Pilot, California, Oregon, and Washington.
- Part IV, United States Coast Pilot.
- Subdivsions 6 and 9, Atlantic Local Coast Pilot.
- Atlantic Tide Tables, 1891.
- Pacific Tide Tables, 1891.
- Notices to Mariners.

From the United States Light-House Board:
- Light List, Atlantic Coast.
- Light List, Pacific Coast.
- Notices to Mariners.
- Beacons, Buoys, and Day marks, various districts, 1891.

From the United States Treasury Department:
- List of merchant vessels, 1890.

From the United States Nautical Almanac Office:
- Ephemeris and Nautical Almanac, 1893.
- Nautical Almanac, 1893.

From the British admiralty (purchased):
- H. N. 3 of 1890, relating to Baltic Pilot.
- China Sea Directory, Vol. I, supplement to.
- Danish Pilot, supplement to.
- H. N. 4 of 1890, Australian Signal Stations.
- Pacific Islands, Vol. I, 1890.
- North Sea Pilot, Part IV, supplement to.
- Tide Tables, British and Irish Ports, 1891.
- Light List, British Islands, 1891.
- Light List, eastern shores North, Baltic, and White seas, 1891.
- Light List, west coast of Europe and Africa, 1891.

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From the British Admiralty (purchased)—Continued.
Persian Gulf Pilot, 1890.
Black Sea Pilot, supplement to.
Africa Pilot, Vol. III.
H. N. 1 of 1891, relating to China Sea Directory, Vol. I.
Current, Ice, and Magnetism on the Coast of Iceland.

N. B.—The purchase of the British Admiralty Light Lists was necessary on account of the appropriation not being sufficient to publish a new edition of the Hydrographic Office Light Lists, all of which have been kept ready for the press; the old editions covering the ground of those purchased have become practically worthless, owing to the many changes and additions to the lights.

From Mr. B. F. Stevens, London (purchased):
Seas and Skies in many Latitudes.
Cyclonic Storms, Bay of Bengal.

VESSELS FITTED OUT.

The following vessels were supplied with outfits of sailing directions and nautical books from the division:

Name of ship.	Outfit furnished.	Remarks.
Essex	South Atlantic Station	Regular outfit for cruising.
Pensacola	do	Do.
Enterprise	do	Do.
Baltimore	European Station	Do.
Philadelphia	North Atlantic Station	Do.
Alert	Asiatic Station	Do.
San Francisco	do	Do.
Enterprise	North Atlantic Station	Do.
Bennington	Special	For trial trip.
Chicago	North Atlantic Station	Regular outfit for cruising.
Boston	do	Do.
Atlanta	do	Do.
Yorktown	do	Do.
Lancaster	Asiatic Station	Do.
Monongahela	Special	For cruising in North and South Atlantic.
Marion	Asiatic Station	Regular outfit for cruising.
Charleston	Pacific station	Do.
School Ship St. Marys	Special	For cruising in North Atlantic.
Newark	North Atlantic Station	Regular outfit for cruising.
Richmond	Special	For navigation on NE. coast of United States.
Baltimore	Additional books for South Atlantic and Pacific Station.	For cruising.
San Francisco	Additional books for Pacific Station.	Do.
Concord	Special	Do.

SUMMARY OF BOOKS, PAMPHLETS, ETC., RECEIVED, ISSUED, PREPARED, AND PREPARING.

Received (including 638 foreign publications purchased)	4,151
Issued, including 560 foreign publications	3,962
Books of reference placed on shelves	111
Prepared and placed on issue	16
Prepared and in the hands of Public Printer	3
Prepared and ready for printer	6
Preparing	3
New or late foreign editions placed on issue	14
Canceled by new or late editions	15

This statement of receipts and issues does not include Beacons, Buoys, and Day Marks of the different districts of the Light-House Board, Light-House Board Light Lists, or Nautical Almanac publications. Neither does it include Hydrographic Office Light Lists nor supplements to Light Lists or Sailing Directions.

ARCHIVE DOCUMENTS.

Three hundred and sixty archive documents containing information of every kind relating to hydrography have been received, indexed, and catalogued. The custodian of archives has been occupied in classify-

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ing, arranging, and issuing these documents, which in the proper division are charged against the charts and sailing directions affected, while a summary is published in a weekly notice, in order that the information may be at once available to the maritime community of the world. We are indebted for most of our hydrographic information to the officers of the United States vessels of war and of the Fish Commission, and the Consular Service, as shown by the following:

U. S. F. C. S. *Albatross*, Lieut. Commander Z. L. Tanner, commanding.
U. S. S. *Alliance*, Commander H. C. Taylor, commanding. Lieut. M. L. Wood, navigator.
U. S. S. *Atlanta*, Capt. J. W. Philip, commanding.
U. S. S. *Bos on*, Capt. C. G. Wiltse, commanding.
U. S. F. S. *Charleston*, Capt. C. G. Remey. Rear-Admiral George Brown commanding Pacific Station.
U. S. S. *Chicago*, Capt. H. B. Robeson, commanding; Lieut. R. P. Rodgers, navigator.
U. S. S. *Enterprise*, Commander J. A. Converse, commanding. Lieut. G. C. Hanus, navigator.
U. S. S. *Essex*, Commander A. S. Snow, commanding.
U. S. S. *Iroquois*, Commander J. Bishop, commanding; Lieut. S. C. Paine, navigator.
U. S. S. *Kearsarge*, Commander H. Elmer, commanding.
U. S. S. *Mohican*, Commander E. M. Shepard, commanding; Lieut. C. W. Tyler, navigator.
U. S. S. *Monocacy*, Commander M. L. Johnson, commanding; Lieut. C. A. Foster, navigator.
U. S. S. *Nipsic*, Lieut. Commander H. W. Lyon, commanding; Lieut. R. G. Davenport, navigator.
U. S. S. *Omaha*, Capt. B. J. Cromwell, commanding; Lieut. J. M. Miller, navigator.
U. S. S. *Pensacola*, Capt. A. R. Yates, commanding; Lieut. A. W. Nichols, navigator.
U. S. S. *Pinta*, Lieutenant Commander O. W. Farenholt, commanding.
U. S. S. *Ranger*, Lieut Commander G. C. Reiter, commanding.
U. S. S. *Richmond*, Lieut. Commander L. Kingsley, commanding; Lieut. W. H. Everett. navigator.
U. S. S. *Tallapoosa*, Commander J. M. Forsyth, commanding; Lieut. J. K. Cogswell, navigator.
U. S. S. *Thetis*, Lieut. Commander C. W. Stockton, commanding; Lieut. J. Downs, navigator.
U. S. S. *Yantic*, Commander C. H. Rockwell, commanding.

U. S. Consul, James M. Ayres, Para, Brazil.
U. S. Consul, Edward L. Baker, Buenos Ayres, Argentine Republic.
U. S. Consul, W. Harrison Bradley, Nice, France.
U. S. Consul, William A. Brown, San Juan del Norte, Nicaragua.
U. S. Consul, David N. Burke, Bahia, Brazil.
U S. Consul, Almar F. Dickson, Gaspé Basin, Quebec.
U. S. Consul, Philip G. Hanna, La Guayra, Venezuela.
U. S. Consul, Charles Heath, Catania, Italy.
U. S. Consul, George L. Hollis, Cape Town, Africa.
U. S. Consul, Joseph A. Jones, Aden, Arabia.
Consul-General, Richard G. Lay, Ottawa, Canada.
U. S. Consul, William E. McCreery, Valparaiso, Chile.
U. S. Consul, Joseph W. Merriam, Iquique, Chile.
U. S. Consul, Charles Negley, Rio Grande do Sul, Brazil.
U. S. Consul, Henry Pease, Santiago, Cape Verde.
U. S. Consul, Horace C. Pugh, Palermo, Italy.
Consular Agent, George Rayson, Marsala, Italy.
U. S. Consul, Otto Reimer, Santiago, Cuba.
U. S. Consul, Leonard B. Smith, Curaçao, West Indies.
U. S. Consul, Thomas Simpson, Puerto, Plata, Santo Domingo.
U. S. Consul, Edwin Stevens, Pernambuco, Brazil.
U. S. Consul, William D. Tillotson, Kanagawa, Japan.
Consular Agent, Arthur Verderame, Licata, Italy.
U. S. Consul, James Viosca, La Paz, Mexico.
U. S. Consul, Alexander R. Webb, Manila, Philippines.
Consul-General, Ramon O. Williams, Havana, Cuba.
U. S. Consul, John Worthington, Malta.

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ARCHIVE CHARTS.

The keeper of the archive charts has been engaged in registering, receiving, and delivering archive charts; also, in examining charts of various nationalities and in comparing the spelling of names of certain places. In addition to his regular duties, the keeper has prepared index charts of those nationalities which do not publish such charts, so that now we possess index charts of eight nationalities beside our own and those of the U. S. Coast and Geodetic Survey. We also possess twenty-three chart catalogues, which have to be compared from time to time with new publications in order that we may be supplied with the latest foreign charts. The following shows a summary of the work performed:

Summary of new or revised charts received in the archives, and of old ones condemned by cancellation.

	Received.	Condemned.		Received.	Condemned.
British Admiralty	353	284	Spanish	22	10
Chilean	10	1	Swedish	14	14
Dutch	24	16	Imray & Son	3	0
French	118	173	U. S. Coast and Geodetic Survey	279	257
German	22	4	U. S. Hydrographic Office	371	0
Italian	24	0			
Japanese	21	13	Total from June, 1891	1,289	773
Norwegian	2	0			
Russian	26	0			

For various reasons and purposes about 8,000 of the archive charts were handled during the year, 5,000 of which were handled and examined by the keeper.

The number of charts issued to United States vessels of war, and therefore subject to correction when affected by Hydrographic Office Notices to Mariners, is as follows:

British Admiralty	2,023
Hydrographic Office	843
U. S. Coast and Geodetic Survey	445
Total	3,311

There are now in the archives of printed charts about 12,000.

NOTICES TO MARINERS.

During the year 1,137 announcements of importance to navigators were published in the form of Notices to Mariners, which were issued promptly on the day of publication, namely, on Saturday of each week, and the circulation of which, with extracts, amounted to 728,029. The yearly index of Notices to Mariners was, for the first time, published from this office, and was issued early in February. Heretofore it has been printed at the Government Printing Office. This shows the great advantage of having the Hydrographic Office work done under its immediate supervision in the branch printing office established in the Navy Department. The usual number of reports and foreign notices have been received, and all requiring it have been translated, the more important being republished as well as a large amount of original matter from reports of United States vessels of war and consuls, and also the reports of our correspondents in the merchant marine of various nationalities.

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A new edition of Light List, Vol. I, has been published corrected to April 15, 1891, in which the list of lights on the coast of the United States was omitted, thereby reducing the size and cost of the book. Volumes 4 and 6 require new editions, as explained in last year's report.

When the Hydrographic Office publications, Nova Scotia and Bay of Fundy, and Gulf and River of St. Lawrence, now ready for the printer, are published, it will give us a complete set of sailing directions of both the east and west coasts of North and South America. Pursuing the system inaugurated in 1885, and going both east and west, there should be completed and published without delay, a full set of sailing directions covering all the navigable waters of the globe.

The storage of books of reference, sailing directions, etc., is very unsatisfactory by reason of the space being inadequate, thus causing the books, pamphlets, etc., to be very much crowded, and necessitating much loss of time in getting them down from the shelves when required for reference.

The status of the six Light Lists published by this office is in a most unsatisfactory condition, and about the same as was stated in my predecessor's report, only four of them, namely, 1, 2, 3, and 5, being in condition to issue. Of these, one was published during the past year and the others require so many corrections that they should be republished at an early date, and volumes 4 and 6 at once. The Light Lists have always been regarded as standard Hydrographic Office publications, but until these volumes, 4 and 6, can be published, we are dependent on British Admiralty Light Lists, which cover the ground for these two Hydrographic Office publications.

DIVISION OF SUPPLY AND ISSUE.

On account of the large amount of work in handling, correcting, and supplying the many thousands of charts which annually pass through this division, and the impracticability of confining its operations to one location, this division is divided into two sections. Heretofore there has been an officer in charge of each section, and should be now, but by reason of the detachment of Lieut. De Witt Coffman, after three years' valuable service, and the subsequent transfer to the New York branch office of Lieut. O. W. Lowry, who was ordered to take his place, the whole work of the division has devolved upon Ensign Louis S. Van Duzer, who, by his energy, zeal, and ability, has kept the division in a most satisfactory condition. The sales of our charts by agents in our own ports continue to show a satisfactory increase, and the total receipts from home and foreign sources is very nearly 20 per cent above last year's figures. The gain in number of charts sold is 1,073 as opposed to 136 for 1889–'90. A tabulated statement of the operations of the division, from which further information may be obtained, is appended hereto.

The preparation of the annual catalogue has taken up a very large portion of Ensign Van Duzer's time for the past four months. The details of cataloguing have been more carefully carried out than in the previous edition, and the information furnished is more definite and uniform in character. This practically required the book to be rewritten. In subsequent editions this need not be done. With some exceptions, unavoidably passed over, the future changes will be chiefly additions or cancellations. It is to be hoped that the office will soon be able to purchase the type and other material sufficient to keep the catalogue standing. This would result in an annual saving of $800. Instead of the expense of each edition being about $900 it would be less

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than $100. If a certain amount of the printing appropriation could be made available for the purchase of material each year the office would soon be able to issue all its publications at regular intervals at a greatly reduced expense instead of being compelled to issue only a few at odd times at enormous cost. There is another consideration which is most important but has not been referred to in connection with this subject. It is the question of proof-reading and the correctness of the books issued—a most important matter with works of precision. So long as the present system is followed, unless a very great amount of time and labor is expended upon proof reading, errors are very liable to and do creep in. By keeping the matter standing the danger of errors is almost eliminated, and proof-reading can be carried on at leisure and with the greatest care.

The system of recording dates of publication has been reduced to uniformity both upon the charts and in the catalogue. The uncertain methods of applying corrections to photolithographic charts have been abolished. The form of the correction will hereafter be identical with that upon the plate charts, and all copies on the shelves will be readjusted as regards correction record as soon as practicable.

The number of photolithographic charts on hand has been reduced from 267 to 231 during the current year by canceling those requiring most extensive correction. A large number will probably disappear from the list during the ensuing twelve months. With the small force of draftsmen in this division it is not possible to give adequate attention to the comparison of these lithographed charts with the information constantly being received in the office. A much further continuance of a great part of these charts is undesirable. They are mostly old, fully one-half having been published previous to 1874; the execution is only fair and the paper is not what it should be. The edition of the following are nearly exhausted and will be reproduced on copper without unnecessary delay:

Photolithographic charts, which should be reproduced, owing to defective condition or limited supply on hand.

No.	Chart.	Remarks.
391	Plans on Central American coast	Entirely exhausted except on issue.
390	Port Limon	10 charts on supply.
386	Chiriqui Lagoon	Entirely exhausted.
	Great Bahama Bank:	
26b	Sheet 2	Do.
26c	Sheet 33	Do.
26d	Sheet 4	Do.
272	Madeira Island	Do.
306	Bahia de Todos os Santos, Brazil	46 copies, 18 months' supply.
325	Island of New Providence, Bahamas	36 copies, 2 years' supply.
350	Harbors in Jamaica	28 copies, 23 months' supply.
358	Island of Grenada	19 copies, 18 months' supply.
372a	Port San Juan, Puerto Rico	46 copies, 18 months' supply.
374	Harbors in Venezuela	34 copies, 18 months' supply.
395	Serrana Bank and other plans	46 copies, 18 months' supply.
399	Negro Head to Turneff Cays	49 copies, 2 years' supply.
402	Mugeres Harbor and other plans	45 copies, 2 years' supply.
404	Campeche Bay	Nearly exhausted.
472	Approaches to Rio de Janeiro	50 copies, 30 months' supply.
514	Corvo and Flores	25 copies, 18 months' supply.
625	Monte Christi to Fort Dauphin Bay	Exhausted on supply, nearly on issue shelves.
629	Tepoca Bay, etc	45 copies, 2 years' supply.
714	Topolobampo Harbor	36 copies, 2 years' supply.
718	Approaches to Port Royal and Kingston	40 copies, 2 years' supply.
810	Dominica Island	35 copies, 1 year supply.
749	Charts of the coast of Chile. The editions of these charts are not exhausted, but the charts are defective and require considerable correction. It seems desirable that they should be replaced by plate charts.	
750		
751		
752		
753		

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479. *Rio Grande and Rio Parakiba, Brazil.*—This chart is partly canceled. The plans should be republished separately.

Hawaiian Islands.—The present general chart of the Hawaiian Islands can not be considered satisfactory for all purposes. A new one should be made on a scale of D long. 4.5, which would include the islands only, and not the reefs to the northwest.

224. *Ping Yang Inlet.*—Recent reports from the United States minister to Korea indicate the growing importance of this place. The present chart needs considerable readjustment; also charts of Fusan Harbor, Broughton Bay, Chemulpho Harbor, and approaches to Chemulpho; and in China, Chifu Harbor, Swatau Harbor, Fu Chau Harbor, approaches to the Yangtse, Yangtse to Wusung Bar, the Wusung River to Shanghai.

A chart of Simonoseki Strait will be needed to supplement 549*a*.

The system of recording corrections upon the charts has resulted in a saving of several hundred dollars during the past year. The following instructions are now carried out in this division.:

METHOD OF RECORDING CORRECTIONS UPON HYDROGRAPHIC OFFICE CHARTS.

In future, when charts come up for reprint and receive corrections, the nature of the corrections will be shown by a record engraved upon the plate, the form of the record to be determined as hereinafter described.

If there are no corrections to be made to the chart when it comes up, then a search is to be made, to see if it has been corrected at all since it was published. If it has never been corrected, then the publication date is also the "date of last correction." But if it is found that the plate has received corrections, then the last of these should be placed upon the plate in the same manner as if the correction were a new one. Thus, for example, suppose chart No. 1000 comes up for print: There are no corrections charged to it, but upon the books it is found that a "small correction" (as per definition hereinafter given) was made in March, 1889, and a notice was added subsequently ('90–16). There were also several previous corrections; but those are unimportant. What is wanted is the last correction, whether small or extensive, and any notice added subsequent to the date of the small correction or extensive correction. Therefore in the case of No. 1000 the following is what is to be applied:

Small correction which can be made on previous editions by hand:
From notices to mariners ('90–16).
From other sources, III.89.

This gives us the date to go back to, and we then know that all copies of No. 1,000 printed since March, 1889, are equally good.

"Small corrections from other sources" (*i. e.*, from other sources than notice to mariners) refer to small changes in topography; important changes in names; additions of semaphores, life-saving stations, signal stations; changes in buoyage (if not too extensive); notes added to charts (explanatory, cautionary, supplementary); corrections to title (or rather to the legend, such as changes in longitude of the observation spot, changes of tidal data, light-house data, etc., and corrections to hydrography which are not particularly dangerous to navigation. The correction may consist of a considerable number of soundings, if they exceed 6 fathoms in depth and do not differ greatly from the depths already shown. In small-scale charts, such as the ocean sailing charts

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and the large coasting charts, corrections very close to the shore are not usually important to navigators. Such corrections, therefore, would be "small corrections" on these charts. Where a correction is small in extent but dangerous to navigation it should be described in the notices to mariners, and if it has not been so published the information should be furnished to the Division of Sailing Directions.

In general it may be said that "small corrections from other sources" are not usually dangerous to navigation, and should admit of being entered by hand on copies of the previous editions without much erasure and in comparatively short time (say fifteen minutes).

"Extensive corrections" refer to corrections of any character that are considerable in extent or very numerous. They should include all very important corrections too extensive to describe in Notices to Mariners. They should not include soundings, even if fairly numerous, if they show an equal or only slightly greater depth than those already in the same locality, unless the new depths are of distinct value to navigation, such as indicating a new channel, or rendering an old channel practicable or available for larger vessels than formerly. The number of soundings which can be trasferred by hand from a new to an old copy in about fifteen minutes should be regarded as the utmost limit of "small corrections." This refers only to soundings which show no material change in depth over those already given, especially no decrease.

It is needless to say that "extensive corrections" and "small corrections from other sources" should not be placed on the chart at the same time. The greater always includes the less. But Notices to Mariners are always recorded, whether other corrections are placed on the chart at the same time or not.

In future neither date of "edition," etc., nor "printed," etc., will be stamped on the chart. In lieu of these a notice will be added to it by means of a rubber stamp as follows:

This chart is corrected to ——, the date of issue from the Hydrographic Office.

This stamp will not be applied to charts issued to vessels of the Navy.

The shelves of this division are becoming unduly crowded with charts. Within a year or two additional space must be provided and it is greatly needed now. As the charts are stowed at present, much time is lost in handling.

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Statement of charts for fiscal year ending June 30, 1891.

	1890.				1891.				Year.	
	Third quarter.		Fourth quarter.		First quarter.		Second quarter.			
	H. O. C.	C. S. C.	H. O. C.	C. S. C.	H. O. C.	C. S. C.	H. O. C.	C. S. C.	C. S. C.	H. O. C.
Copies of charts rec'd:										
From division of chart construction	4,664	.....	4,960	.....	7,208	.....	10,735	.....	.....	27,562
From Coast Survey	.....	362	.....	572	.....	1,410	.....	1,497	3,841	.....
	.....	96	.....	34	.....	.....	.....	56	186	.....
From other sources	12	.....	165	.....	601	.....	117	.....	.....	895
Total	4,676	458	5,125	606	7,804	1,410	10,852	1,553	4,027	28,457
Copies of charts issued:										
To naval vessels	1,631	281	1,489	268	3,343	1,230	1,468	1,069	2,848	7,931
To agents	1,858	.....	2,503	.....	3,268	.....	2,595	.....	..	10,224
To archives	83	86	65	42	94	57	130	92	277	372
To office use	118	6	104	26	123	87	234	37	156	579
To branch offices	638	.....	444	.....	605	.....	1,040	.....	.....	2,727
To merchant vessels (for observers)	4	.....	15	.....	29	.....	29	.....	.....	77
To foreign hydrographers	30	.....	31	.....	33	.....	67	.....	.....	161
To home correspondents	196	.....	155	.....	237	.....	337	.....	.....	925
Miscellaneous	150	26	574	9	415	89	410	67	191	1,549
Total	4,708	399	5,380	345	8,147	1,463	6,310	1,265	3,472	24,545
Total H. O. & C. S. charts issued	.....	.....	.....	.....	.....	.....	.....	.....	.....	28,017
Charts published	6	.....	13	.....	19	.....	19	.....	.....	57
Copies of charts condemned	207	38	205	57	205	40	312	83	218	929
Charts canceled	10	.....	12	.....	11	.....	12	.....	.....	45
Plans canceled	2	.....	.....	.....	1	.....	1	.....	.....	4
Copies of canceled charts condemned	587	.....	1,142	.....	730	.....	1,077	.....	.....	3,536

Number of plate charts now on hand	622
Number of lithograph charts now on hand (including index charts)	241
Total charts published	863

The system of accounts in the British Admiralty section of this division is found to work very satisfactorily, and seems to need no modification at present. The station catalogues are very full of corrections, and all need republication. The supply of those for the North Atlantic station is nearly exhausted and should be the first to be taken in hand.

Owing to the deficient appropriation for purchase of charts during the past year the shelves of the British Admiralty section are very low. To replace them will be an additional charge upon the appropriation for the current year.

The following ships have received full outfits of charts during the year:

Enterprise, *Essex*, *Pensacola*, for the South Atlantic. The outfit of the *Enterprise* was returned shortly afterward.

Baltimore, European station.

Philadelphia, *Enterprise*, *Chicago*, *Boston*, *Atlanta*, *Yorktown*, and *Newark*, North Atlantic station.

San Francisco (afterwards transferred to *Marion*), *Alert*, and *Lancaster*, Asiatic station.

San Francisco, *Charleston*, Pacific station.

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Special or partial outfits were furnished to the following:

Baltimore, Pacific (returned without being used).
Pensacola, Pacific.
St. Mary's, outfit to cover east coast of United States and English Channel.
Monongahela, training-ship outfit.
Constellation, east coast of United States from the capes north.
Nina, tug outfit to replace old one.

Statement of charts issued, received, corrected, etc., in the British Admiralty section for the years ending July 1, 1889, 1890, *and* 1891.

	1889–'90.	1890–'91.
Received from—		
J. D. Potter, Admiralty agent	5,354	3,579
B. F. Stevens, U. S dispatch agent	1,704	411
United States vessels (returned outfits)	1,839	2,640
British Admiralty (complimentary)	186	252
Divisions and branch offices (returned	52	4
Total British Admiralty	9,135	6,886
Coast Survey	7,104	5,335
Hydrographic Office section (Hydrographic Office charts)	6,681	7,919
Total charts received	22,920	20,140
Issued (British Admiralty charts):		
From this office to United States vessels	5,952	5,622
From B. F. Stevens	1,704	411
Branch Hydrographic offices	349	.....
Archives	596	144
Miscellaneous	137	36
Total British Admiralty	8,738	6,213
Issued, Hydrographic Office and Coast Survey charts:		
Hydrographic Office charts from this office	6,681	7,919
Coast Survey charts from this office and Coast Survey Office	7,100	5,335
Total charts issued	22,519	19,467

British Admiralty charts on hand July 1, 1890	10,154	
British Admiralty charts received during year	6,886	
Total		17,040
British Admiralty charts issued during the year	6,213	
British Admiralty charts condemned	967	
Total expenditures		7,180
British Admiralty charts on hand		9,860

Corrections made on British Admiralty charts.

	1889–'90.	1890–'91.
From notices to mariners:		
Total number of charts affected by notices	1,555	1,200
Total number of charts corrected by notices	3,670	3,239
Total number of charts corrected by hand from British Admiralty and other data	7,200	7,257
Total number of receipt letters written to vessels	.....	1,262

There have been 50 new British Admiralty charts received and put on issue, 20 canceled by Hydrographic Office charts, and of the British Admiralty charts issued to United States vessels 30 have been withdrawn by the British Admiralty. The total number now issued to United States vessels is 2,023.

DIVISION OF MARINE METEOROLOGY.

This division has been in charge of Lieut. H. M. Witzel, U. S. Navy, who, in his successful administration, has been ably assisted by Ensign Everett Hayden, U. S. Navy, as meteorologist and editor of the Pilot Chart.

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The assistants employed in the division remain the same as when I submitted my last report. Their industry and the skill they have acquired in the work assigned them makes it possible to publish the Pilot Chart and the Hydrographic Bulletin with regularity and success; but their number is too small to make an exhaustive study of the data on the various meteorologic and other phenomena reported to the office. The synoptic charts for the North Atlantic, on which are plotted Greenwich noon observations on the height of the barometer, the direction and force of the wind, the state of the sky and the weather at the place of observation, have been kept up to date, and they are a most valuable aid in tracing the development and progress of atmospheric disturbances within that region; but observations on the temperature and hygrometric state of the air, the direction of cloud motion, the force and direction of the sea, and the temperature of the sea water at the surface, are only available in such a study by reference to the reports themselves, because it has been impossible, from the lack of force, to plot them on the proper charts. Ensign B. F. Wright, U. S. Navy, was attached to the division for a short time and commenced the study of surface temperatures in the North Atlantic, utilizing the reports on file; but, unfortunately, he was detached and assigned to duty under another office before definite results were obtained from work which promised considerable addition to our knowledge, and the work so interrupted could not be continued. Some idea of the amount of information available for investigations of this nature can be formed, when it is stated that last year reports of marine meteorology were received from 877 vessels. It is, therefore, very desirable that an additional assistant be appointed, so that a part, at least, of the data enumerated above may be made practically available in the investigations which this division ought to make. It is to be considered also that data for other oceans than the North Atlantic are accumulating and are used only in a fragmentary way at present. These should be made available for use, in the preparation for sailing directions, even if it will be some time before anything similar to the Pilot Chart of the North Atlantic can be published for other oceans.

The Pilot Chart, under Mr. Hayden's able editing, has been published each month, and continues to command the praise of those interested in navigation, as is amply shown by the favorable comment and criticism of the press, both at home and abroad, as well as by the direct testimony of shipmasters. The purpose has been steadily adhered to to give the navigator, briefly and clearly, in a graphic form when possible, and as soon after the event as sufficient data are at hand, a description of the general atmospheric and other phenomena which he is liable to encounter, so that the recorded experience of many will be readily accessible to the individual, to aid him in determining upon a course of action in the trying circumstances in which he is frequently placed. In accordance with this purpose, there have been published a number of supplementary charts showing the state of wind, weather, and barometer in both cyclonic and anticyclonic systems, diagrams showing the advance of heavy seas before a still distant hurricane, and charts of surface temperatures on the Grand Banks on an occasion of especial interest. Reprints of these various charts and diagrams were also made for general distribution among observers, as they can be easily preserved and readily referred to. On the Pilot Chart for November, 1890, was published a small chart showing the drift of bottle papers in the North Atlantic received by the office up to that time. The list was completed to June 30, 1891, by a supplement

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issued with the Pilot Chart for July, 1891. General storm diagrams, with explanations for their use, and cuts, with text, explaining the information, cautionary, and storm signals used by the signal service, have appeared on each chart. On the charts for May, June, and July, were published curves, reduced from careful copies of the original records, showing the magnetic declination as automatically recorded at the Naval Observatory from March 29 to June 29. It is hoped that these curves will call the attention of navigators to the importance of forwarding to this office careful observations on the variation of the compass for use in the corrections of charts, and that they will be useful to investigators who seek to establish a connection between magnetic disturbances and meteorologic phenomena.

The Hydrographic Bulletin has been published weekly. Its scope has not been altered, but a few changes, tending to brevity and greater clearness, have been effected in its forms.

There have been collected a number of reports on the meteorology of the Atlantic during the period covered by the American eclipse expedition to West Africa, but arrangements for their discussion and publication have been delayed from want of sufficient office force. A preliminary report on the Samoan hurricane of March 15–16, 1889, has been prepared by Mr. Hayden and published in the proceedings of the United States Naval Institute. It is hoped that this report will call attention to the efforts which this office is making to collect more data on that memorable storm, and will induce those who can give additional information bearing on it to do so, so that when a final report is prepared there will be good reason to believe that all recorded observations have been considered.

Cards have distributed on which barometer readings observed in port can be very conveniently recorded, and by their means it has been possible to keep a very satisfactory check on the errors of the barometers. A new edition of the pamphlet, Form 105, has been prepared and will be issued as soon as the old edition is exhausted. The chief difference from the old pamphlet is the addition of a new blank, 105*b* (abstract storm-log), which has been provided for recording observations made at any convenient time during heavy weather. The text on the bottle papers has also been carefully revised.

DIVISION OF BRANCH OFFICES.

This division conducts the correspondence connected with the supervision of the branch offices; it also has charge of the stationery, wrapping, mailing, printing, and the general executive duties of the office. Lieut. R. G. Davenport, U. S. Navy, was transferred from the charge of this division to that of Sailing Directions in April, and since then, due to the scarcity of officers available for shore duty, this division has remained, I regret to say, without a head.

Very respectfully,

RICHARDSON CLOVER,
Lieutenant-Commander, U. S. Navy,
Hydrographer to the Bureau of Navigation.

Commodore F. M. RAMSAY, U. S. NAVY,
Chief of the Bureau of Navigation,
Navy Department, Washington, D. C.

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D.

ESTIMATES OF APPROPRIATION REQUIRED FOR THE SERVICE OF THE FISCAL YEAR ENDING JUNE 30, 1893, BY THE BUREAU OF NAVIGATION, NAVY DEPARTMENT.

FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.

A.

Salaries.

Chief clerk (March 3, 1891)	$1,800.00
Four clerks of class 4 (March 3, 1891)	7,200.00
Three clerks of class 3 (March 3, 1891)	4,800.00
Three clerks of class 2 (March 3, 1891)	4,200.00
Four clerks of class 1 (March 3, 1891)	4,800.00
One clerk (March 3, 1891)	1,000.00
One copyist* (March 3, 1891)	900.00
One copyist (March 3, 1891)	720.00
One assistant messenger (March 3, 1891)	720.00
Three laborers at $660 each (March 3, 1891)	1,980.00
Total	28,120.00

B.

I.—*Salaries, Hydrographic Office.*

Two clerks of class 2. (Appropriated)	2,800.00
One clerk of class 2. (Appropriated)	1,200.00
One assistant messenger. (Appropriated)	720.00
One watchman. (Appropriated)	720.00
Draftsmen, engravers, assistants, nautical experts, computers, custodian of archives, copyists, copper-plate printers, apprentices, laborers and helpers in the Hydrographic Office. (Appropriated)	40,000.00
Total	45,440.00

II.—*Contingent and miscellaneous expenses, Hydrographic Office.*

Purchase of copper plates, steel plates, chart paper, electrotyping copper plates, cleaning copper plates, tools, instruments, and materials for drawing, engraving and printing; materials for and mounting charts; data for charts, and sailing directions; reduction of charts by photography; photolithographing charts for immediate use; transfer of photolithographic and other charts to copper; care and repairs to printing presses, furniture, instruments, and tools; extra drawing and engraving; translating from foreign languages; expert marine, meteorological, and other work in the preparation of the Pilot Chart and supplements, and the printing and mailing of the same; and purchase of, compiling and arranging data for charts, sailing directions, and other nautical publications; works and periodicals relating to hydrography, marine meteorology, navigation, and surveying. (Appropriated)	31,000.00
Rent of building for printing presses, draftsmen, and engravers; storage of copper plates and materials used in the constructing and printing of charts; repairs and heating of the same, and for gas, water, and telephone rates. (Appropriated)	1,500.00

* This copyist was allowed to the Bureau by the appropriation act approved July 11, 1890, for the fiscal year ending June 30, 1891, and was also authorized by both Houses of Congress at the last session, but the words "one copyist" were accidentally omitted when the bill was engrossed. It will be seen that the total amount allowed by the appropriation act for the year ending June 30, 1892, includes the $900.00 for this copyist.

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II.—*Contingent and miscellaneous expenses, Hydrographic Office*—Continued.

Contingent expenses of branch offices at Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, San Francisco, Port Townsend, Portland, Oregon, Portland, Me., and Chicago, including furniture, fuel, lights, rent, and care of offices, car fare, and ferriage in visiting merchant vessels, freight, express, telegrams, and other necessary expenses incurred in collecting the latest information for the Pilot Chart, and for other purposes for which the offices were established. (Appropriated)	$17,800.00
Rent for New York office. (Appropriated)	1,000.00
Total	51,300.00

NOTE.—The offices at Portland, Me., and Chicago, Ill., were added to the list by act of July 11, 1890, and the office at Port Townsend, Wash., by the act of March 3, 1891, but the appropriation was made in gross sum, the same as for previous years, which is not sufficient for the proper maintenance of offices already in operation, hence it has been impossible to establish them.

FOR THE NAVAL SERVICE.

I.—*Gunnery exercises.*

For prizes for excellence in gunnery exercises and target practice; diagrams and reports of target practice for the establishment and maintenance of targets and ranges; for hiring established ranges, and for transportation to and from ranges. (Appropriated)	6,000.00

II.—*Ocean and lake surveys.*

For ocean and lake surveys, the publication and care of the results thereof; the purchase of nautical books, charts, and sailing directions, and freight and express charges on same; preparing and engraving on copper plates the surveys of the Mexican coasts, and the publication of a series of charts of the coast of Central and South America. (Appropriated)	14,000.00

III.—*Outfits for naval apprentices.*

For bounties for outfits of 750 naval apprentices, at $45 each. (Appropriated)	33,750.00

IV.—*Transportation, recruiting, and contingent navigation.*

For expenses of recruiting for the naval service; rent of rendezvous and expenses of maintaining the same; advertising for men and boys; printing, and all other expenses attending the recruiting for the naval service, and for the transportation of enlisted men and boys at home and abroad; for heating apparatus for receiving and training ships, and extra expenses thereof; for freight, telegraphing on public business, postage on letters sent abroad, ferriage, ice, apprehension of deserters and stragglers, continuous-service certificates, discharges, good-conduct badges and medals for boys; books, stationery and musical instruments for training ships; packing boxes and materials, and other contingent expenses, and emergencies arising under the cognizance of the Bureau of Navigation, unforeseen and impossible to classify. (Appropriated)	45,000.00

V.—*Naval War College and Torpedo School.*

For maintenance of the Naval War College and Torpedo School on Coaster Harbor Island, and care of grounds for same. (Appropriated)	10,000.00

VI.—*Naval training station.*

For dredging channels, repairs to main causway, roads, and grounds, extending sea wall and the employment of such labor as may be necessary for the proper care and preservation of the same: for repairs to wharf and sea wall; for repairs and improvements on buildings; heating, lighting, and furniture for same; books and stationery, freight and other contingent expenses; purchase of food, and maintenance of live stock, and mail wagon and attendance on same. (Appropriated)	23,000.00

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VII.—*Naval Academy.—Pay of professors and others.*

For one professor of mathematics, one of chemistry, and one of physics, at $2,500 each. (Appropriated)	$7,500.00
For two professors (assistants), namely, one of French and Spanish, and one of English studies, history and law, at $2,200 each. (Appropriated)	4,400.00
For five assistant professors, namely, one of English studies, history and law, three of French, and one of drawing, at $1,800 each. (Appropriated)	9,000.00
For one sword master, at $1,500, and two assistants, at $1,000 each. (Appropriated)	3,500.00
For one boxing master and gymnast, at $1,200. (Appropriated)	1,200.00
For one assistant librarian, at $1,400. (Appropriated)	1,400.00
For one secretary of the Naval Academy, at $1,800. (Appropriated)	1,800.00
For two clerks to the Superintendent, at $1,200 and $1,000, respectively. (Appropriated)	2,200.00
For one clerk to the commandant of cadets, at $1,200. (Appropriated)	1,200.00
For one clerk to the paymaster, at $1,200. (Appropriated)	1,200.00
For one dentist, at $1,600. (Appropriated)	1,600.00
For one baker, at $600. (Appropriated)	600.00
For one mechanic in department of physics and chemistry, at $730. (Appropriated)	730.00
For one cook, at $325.50. (Appropriated)	325.50
For one messenger to Superintendent, at $600. (Appropriated)	600.00
For one armorer, at $649.50. (Appropriated)	649.50
For one chief gunner's mate, at $529.50. (Appropriated)	529.50
For one quarter gunner, at $433.50. (Appropriated)	433.50
For one coxswain, at $469,50. (Appropriated)	469.50
For one seaman in department of seamanship, at $397.50. (Appropriated)	397.50
For one attendant in department of astronomy, and one in the department of physics and chemistry, at $300 each. (Appropriated)	600.00
For six attendants at recitation rooms, library, store, chapel, and offices, at $300 each. (Appropriated)	1,800.00
For one bandmaster, at $528. (Appropriated)	528.00
For twenty-one first-class musicians, at $348 each. (Appropriated)	7,308.00
For seven second-class musicians, at $300 each. (Appropriated)	2,100.00
For services of organist at chapel of Naval Academy, at $300. (Appropriated)	300.00
For increase of pay of one clerk in Superintendent's office.* (Submitted)	200.00
For increase of pay to quarter gunner, to amount allowed by law.† (Submitted)	36.00
For increase of 20 per cent on $528, pay of bandmaster.‡ (Submitted).	105.60
For increase of 20 per cent on $348 each, pay of 21 first-class musicians, $69.60 each.§ (Submitted)	1,461.60
For increase of 20 per cent on $300 each, pay of 7 second-class musicians, $60 each. § (Submitted)	420.00
For one bookbinder for Naval Academy, at $600.‖ (Submitted)	600.00
For pay of electrician at Naval Academy, at $800¶ (submitted)	800.00
Total	55,994.20
For special course of study and training of naval cadets, as authorized by act of Congress approved August 5, 1882 (appropriated)	5,000.00

* Increase of pay asked because his present rate of pay is not believed to be commensurate with the duties of his office, which are arduous and important.

† Increase asked in order that his pay may be made equal to that of a quarter gunner in general service. His present pay is that given to such quarter gunner before the last increase.

‡ An increase of pay for all bandsmen is asked, because it is believed that good men can earn more elsewhere than the present rate, and as much as is asked for.

§ If continued on the present rate of pay, it is feared the best will go, leaving only indifferent musicians.

‖ The amount of bookbinding done at the Academy justifies the establishment of the new position, which would tend to economy.

¶ The position of electrician, at $800 per annum, is recommended because of the amount of work necessary to keep electrical apparatus in proper working condition. The nature of the work requires a skilled mechanic.

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For pay of watchmen, mechanics, and others.

For captain of the watch and weigher, at $2.50 per diem (appropriated)	$912.50
For four watchmen, at $2 per diem each (appropriated)	2,920.00
For foreman of gas and steam-heating works of the Academy, at $5 per diem (appropriated)	1,825.00
For labor at gas works and steam buildings; for masons, carpenters, and other mechanics and laborers, and for care of buildings, grounds, wharves, and boats (appropriated)	37,864.95
For one attendant in purifying house of gas-house, at $1.50 per diem (appropriated)	547.50
Total	44,069.95

For pay of steam employés, Naval Academy.

For pay of mechanics and others in department of steam engineering (appropriated)	7,824.50

For repairs and improvements, Naval Academy.

For necessary repairs of public buildings, pavements, wharves, and walls inclosing the grounds of the Naval Academy, improvements, repairs, furniture and fixtures (appropriated)	21,000.00

Heating and lighting Naval Academy.

For fuel and for heating and lighting Academy and school ships (appropriated)	17,000.00

Contingent and miscellaneous expenses, Naval Academy.

For purchase of books for the library (appropriated)	2,000.00
For stationery, blank books, models, maps, and text-books for use of instructors (appropriated)	2,000.00
For expenses of Board of Visitors to Naval Academy, being mileage and $5 per diem for each member for expenses during actual attendance at the Academy (appropriated)	1,500.00
For purchase of chemicals, apparatus, and instruments in department of physics and chemistry, and for repairs of the same (appropriated)	2,500.00
For purchase of gas and steam machinery, steam pipes and fittings, rent of buildings for use of the Academy, freight, cartage, water, music, musical and astronomical instruments, uniforms for the bandsmen, telegraphing, feed and maintenance of teams, current expenses and repairs of all kinds, and for incidental labor and expenses not applicable to any other appropriation (appropriated)	32,000.00
For stores in department of steam engineering (appropriated)	800.00
For material for repairs in steam machinery (appropriated)	1,000.00
Total	41,800.00
For continuing the grading and improvement of the property condemned under act making appropriations for the naval service for the fiscal year ending June 30, 1890, and the adjacent ground, and for the improvement of the water front thereof, to be immediately available (appropriated)	15,000.00

RECAPITULATION.

NAVAL ACADEMY.

For pay of professors and others	$55,994.20
For special course study	5,000.00
For pay of watchmen and others	44,069.95
For pay of steam employés	7,824.50
For repairs and improvements	21,000.00
For heating and lighting	17,000.00
For contingent and miscellaneous	41,800.00
For continuing grading and improvement	15,000.00
Total	207,688.65

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FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.

A.— I. Salaries, Bureau of Navigation	$28,120.00
B.— I. Salaries, Hydrographic Office	45,440.00
B.—II. Contingent and miscellaneous expenses, Hydrographic Office	51,300.00
Total	124,860.00

FOR THE NAVAL SERVICE.

I. Gunnery exercises	6,000.00
II. Ocean and lake surveys	14,000.00
III. Outfits for naval apprentices	33,750.00
IV. Transportation, recruiting and contingent navigation	45,000.00
V. Naval War College and Torpedo School	10,000.00
VI. Naval Training Station	23,000.00
VII. Naval Academy	207,688.65
Total	339,438.65

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REPORT

OF THE

CHIEF OF THE BUREAU OF ORDNANCE.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
Washington City, November 17, 1891.

SIR: I have the honor to submit the annual report of this Bureau, and also to transmit estimates for the fiscal year ending June 30, 1893, viz:

(1) Fuel, tools, material, and labor; expenses of target practice, maintenance of new proving ground, boiler and engine therefor; proof of naval armaments and construction of a telegraph line from the navy-yard, Washington, to the new proving ground, Indian Head, Maryland	$205,000.00
(2) General repairs to ordnance buildings, machinery, magazines, and appendages	30,000.00
(3) Freight and miscellaneous expenses	10,000.00
(4) Torpedo outfits for the *Atlanta*, *Boston*, and *Chicago*	82,000.00
(5) Arming and equipping naval militia	25,000.00
(6) Civil establishment at navy-yards	32,041.25
(7) General expenses of the torpedo station	60,000.00
(8) New machinery for the breech mechanism shops at the Washington navy-yard	100,000.00
(9) Purchase of steel plates	50,000.00
(10) Towards the armament of vessels authorized	4,186,250.00
Total	4,780,291.25

BREECH-LOADING RIFLES.

The general system of manufacture and construction has been adhered to, but the increasing length of guns demanded by progress in powders and otherwise has required modifications in the design, especially of the larger calibers, in the direction of stiffening against longitudinal flexure and an increase of strength generally along the chase.

The number of guns required to arm the new vessels provided for by law, the number of sets of forgings thus far ordered, the number which have been delivered, and the number of guns completed to date are stated in the following table:

Caliber.	No. of guns required to arm vessels provided for by law.	No. of sets of forgings ordered.	No. of sets of forgings delivered.	No. of guns completed.
4-inch	69	35	35	7
5-inch	56	29	29	3
6-inch	129	134	134	117
8-inch	51	51	21	19
10-inch	22	25	14	8
12-inch	8	8	4	1
13-inch	12	12	0	0
Total	347	294	237	155

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Of these guns all calibers up to and including the 10-inch have passed beyond the experimental stage, having been thoroughly tested on board ship and on the firing ground.

Although no guns of 16-inch caliber are at present required for the armaments of ships provided for by law, it is not unlikely that the time may come when it will be desirable to construct guns of the largest practicable caliber. The Washington gun factory is equipped for the manufacture of such guns, and the Bureau recommends that the construction of at least one 16-inch gun and mount be authorized. A design of this caliber has been made and it is believed that the difficulties experienced abroad with the guns of the larger bores may be overcome without serious trouble.

Forgings for the tube and jacket of the first of the 13-inch guns intended for the armament of the battle ships have been completed and will shortly be delivered by the contractors, and this caliber will then be rapidly pushed to completion and placed on the firing ground for test and the development of a suitable powder. The delay in the delivery of the material for this purpose has been due to the lack of tempering facilities for the length required.

The first 12-inch gun of 35 calibers length of bore has been completed and sent with its mount to the naval proving ground at Indian Head, Maryland, for proof and the development of a suitable powder. Three more guns of this caliber are in course of construction and are nearly completed.

Of the 10-inch caliber, the third and fourth of the main battery of the *Miantonomoh*, with their mounts, have been completed, tested, and supplied to that vessel. The four 10-inch guns required for the *Terror* have also been completed and the two for the *Monterey* are rapidly approaching completion.

A device for operating the breech mechanism of heavy guns by hand, referred to in the last report, has been applied to the 10-inch caliber and has worked very satisfactorily on the proving ground. A similar design will be applied to the 12-inch gun.

Of the 8-inch guns finished since the last report only two have been issued to the service—those of the U. S. S. *Charleston*—the rest await the completion of the vessels upon which they are to be installed.

The Bureau has contracted for two sets of forgings for 8-inch guns of 40 calibers in length, which are to form part of the main batteries of Cruisers Nos. 12 and 13. The first set of these forgings will be delivered in the near future and work thereon will be immediately commenced and rapidly pushed to completion. It will be noted, in addition to the other remarkable qualities of these vessels, that their batteries are exceptionally powerful, and that they will thus be able to operate in bombardment at ranges sufficiently great to insure their own protection.

An 8-inch gun of 30 calibers, the jacket of which was furnished by Messrs. Whitworth & Co., of England, and the remainder of the forgings purchased in this country, has been completed and is now ready for issue to the service.

The 6-inch gun of 40 calibers length of bore has been manufactured and tested at Indian Head, Maryland. Its performance was satisfactory, a velocity of 2,180 foot seconds with a pressure of 15 tons having been obtained, using service brown powder. It is intended to supply these guns to Cruisers 7, 8, 12, and 13.

The Bureau expects within the coming year to change certain features of its breech mechanism and mount after the rapid-fire system. It is confidently hoped that largely increased effectiveness will be obtained.

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The manufacture of 6-inch guns of 35 calibers has been proceeded with to the completely successful experimental development of the piece. The first specimen of this type was used in the late armor trials of September, 1890, where foreign plates were tested with results which are well known.

A 6-inch gun of this type has been furnished the Bethlehem Iron Company for use in comparative tests of armor. Cruisers Nos. 9, 10, and 11 will be armed with 6-inch guns of this length of bore.

The development of the rapid-fire guns of 4-inch and 5-inch calibers has been somewhat delayed by lack of cartridge cases.

One 5-inch rapid-fire gun is completed and with its mount is awaiting trial, which will take place as soon as its cartridge cases are obtained. Meanwhile all the other 5-inch guns for which forgings have been ordered have been assembled and can be finished in a very short time after the final dimensions of the chamber are fixed upon.

A small lot of 4-inch cartridge cases having been delivered by the Winchester Repeating Arms Company, the Bureau has been enabled to test the 4-inch rapid-fire gun and has had most satisfactory results. The gun tried was fitted with the slotted screw breech mechanism operated by a device of Ensign R. B. Dashiell for rapid opening and closing and the ejection of the fixed cases. Salvos of five rounds each were tried for rapidity of fire, the first five rounds taking 26 seconds, the second five rounds 22 seconds, and the third five rounds 17 seconds. It will be understood, however, that these rounds were fired with the gun in a fixed position, as with powder furnishing smoke it would be impracticable to aim with any such rapidity.

The gun, breech mechanism, mount, and cartridge cases all operated in a most satisfactory manner, and the Bureau, believing that this caliber may be considered as having passed the experimental stage, will at once proceed to the rapid completion of as many of these guns as are needed for ships in construction.

The prospects for smokeless powder for these calibers are extremely favorable, and it is anticipated, before this report is in print, that the conditions of this feature of the outfit will have been successfully settled.

In contracting for a number of 6-pounder rapid-fire guns the Bureau has caused their length to be increased five calibers with a view to augment their effectiveness and also to render them more suitable to the use of the smokeless powder, which will doubtless soon be exclusively used in all rapid-fire guns.

The five 6-pounder field pieces for which forgings were ordered, as mentioned in the last report, have been completed.

Twenty-five more of the high-power 1-pounder guns referred to in the last report have been ordered, making forty of these guns, while there are but fifteen of the old-fashioned 1-pounders in service, the Bureau has determined to increase the powder charge of these guns with a view to at once realizing their full power.

In this connection, the Bureau desires to recommend that the caliber and weights of all projectiles used in the Army and the Naval service be made uniform in order that in case of war an interchange of ammunition may be made without confusion or difficulty.

The subject of artillery construction has remained under the principal charge of Prof. P. R. Alger, whose eminent services in this line have been noted in previous reports of this Bureau since the commencement of the new constructions.

Ensign I. K. Seymour has also been employed upon this branch of ordnance work during the year, and the Bureau desires to commend his industry and ability.

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POWDER.

The manufacture of brown powder for the Navy has continued by Messrs. E. I. Du Pont & Co., of Wilmington, Del.

Brown powder for the 6-inch and 8-inch guns is now produced with uniform success in advance of the demand for it for the new ships. The requirement for this powder is 2,000 foot seconds in the 30-caliber guns, 2,100 foot seconds in the 35-caliber guns, and 2,175 foot seconds in the 40-caliber guns, the chamber pressure in no case to exceed 15 tons per square inch.

Samples of 12-inch powder have been ordered and will immediately be tested at Indian Head. No special difficulties are anticipated in the development of a suitable brown powder for this caliber.

A satisfactory brown powder has been obtained for the 10-inch guns of the *Miantonomoh* and has been supplied to that vessel.

Numerous other samples of 10-inch brown powder have been tested with fair results, and it is believed that there will be no difficulty in supplying powder for this caliber as fast as required.

Messrs. Laflin and Rand have presented three samples of prismatic powder for trial in the 6- and 8-inch guns, but although showing an improvement on that heretofore tested they failed to meet the requirements of the Bureau.

The same grain as is used in the 6-inch guns is found to give good results in the 4-inch guns, and pending the development and adoption of smokeless powder will be used in this caliber. In the 5-inch rapid-fire gun, a velocity of 2,280 foot seconds has been obtained with a pressure of 13.6 tons, using this same powder, and even better results are anticipated with a smaller grain, which has been ordered and will soon be supplied.

A new square-grained powder for use in the smaller caliber of rapid-fire guns has been tried with promising results; the grains are of black powder coated with brown.

STOWAGE OF AMMUNITION.

The subject of the stowage of ammunition on board ship has many important bearings, as it is necessary that the explosives shall remain unchanged in considerable variations of temperature and hygrometric conditions, during long periods of time. Facility of access for distribution to the battery and convenience of stowage for the greatly increased amounts issued for modern artillery are problems the solution of which, under the cramped conditions existing afloat present grave difficulties. It is only after prolonged experience that these can be considered as satisfactorily solved.

The Bureau desires to note in this connection the valuable study and services of Lieut. C. J. Boush, who has charge of this matter.

SMOKELESS POWDER.

During the year the Bureau has made numerous experiments with a smokeless powder invented by Prof. C. E. Munroe of the Naval Torpedo Station and developed and manufactured at that station under the direction of Commander T. F. Jewell, inspector of ordnance in charge.

Beginning with the small arm and continuing by progressive experiments through the 1, 3, and 6 pounder guns up to the 4-inch rapid-fire

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gun, promising results have been obtained in all cases. With charges about one-half those used with ordinary powders, the velocities were increased from 150 to 200 foot seconds with no increase of chamber pressure.

This powder contains no unstable or volatile constituents, is unaffected by repeated heating for long periods, and is uninjured even by boiling in water, though while wet it will not burn. It can not be detonated, either by the direct action of fulminate when closely confined, or by influence, and, in fact, will successfully undergo tests of unusual severity.

The results obtained at the Naval Torpedo Station have been checked by experiments at other points and with independent apparatus.

The following are some of the firing results:

One hundred rounds were fired from a small arm of caliber .315, using a steel-coated bullet of 216 grains and a charge of 42 grains of smokeless powder. The mean muzzle velocity, measured in 50 of these rounds, was 2,260 foot seconds and the mean chamber pressure measured in the other 50 rounds, was 14 tons. The variations from the mean in velocity were very small and the variations in the observed pressures, while greater, were not more than should be expected with the small arm pressure gauge. In the 3-pounder rapid-fire gun a velocity of 2,250 foot seconds was given by a charge of 310 grams with a chamber pressure of 14.8 tons, and in the 6-pounder, a charge of 418 grams gave a velocity of 2,040 foot seconds with 14.5 tons pressure.

It is believed that within a very short time the use of gunpowder will be entirely abandoned, in calibers of 6-inch and below it, being replaced by some one of the numerous forms of so called smokeless powders, and the Bureau feels gratified with the progress made in this direction.

HIGH EXPLOSIVES.

During the year experiments with high explosives have been continued, chiefly with gun cotton and emmensite.

Gun cotton is undoubtedly the best known explosive for naval uses. It is safer in manufacture, handling, and transportation, even than gun powder; it is quite insensitive to shock, will not explode by ignition, is effective at very low temperatures, and wet, as well as dry, and does not deteriorate when stored for long periods. The growing needs of the service for this explosive, its probable use in large quantities in the manufacture of smokeless powders, and the certain demand for its production in war time at a rate far beyond that possible with existing facilities induced the Department to consider their extension. To this end an offer of an order for 50,000 pounds of gun cotton was made to Messrs. E. I. Du Pont & Co., of Wilmington, Del., contingent upon establishing a complete plant for its production. This offer having been accepted, the Department has placed at the disposal of this company all its knowledge and experience gained in the manfucture of gun cotton at the Naval Torpedo Station, and within two months their plant will be in working order, capable of turning out 1,000 pounds of gun cotton per day of twenty-four hours, and with facilities for rapid extension, if this at anytime be found desirable. Besides this the capacity of the gun-cotton factory at the Torpedo Station, Newport, R. I., at present the only source of supply in the country, has, during the year, been nearly doubled by the addition of an enlarged drying room and another set of cooling troughs.

Experiments have continued with shell loaded with gun cotton and

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fired from powder guns with uniform success, but the necessity of using a fulminate fuse for detonating these shell has caused the Bureau to seek an explosive which, while as powerful as gun cotton, can be detonated by a fuse of less sensitive composition than fulminate of mercury. As mentioned in the last report, emmensite seemed to promise to fulfill the desired conditions, and during the year experiments made at the torpedo station have resulted in the production of a fuse mixture, which, while insensitive to shock and percussion, will, when simply ignited, explode emmensite with a high degree of certainty and with an effect approaching detonation.

Experiments at the naval ordnance proving ground, at Annapolis, Md., with a fuse composition suggested by the Bureau have been equally successful. Emmensite, when strongly confined, was exploded with effect equal to those of detonated gun cotton by the simple ignition of this composition in its midst. For example, an 8-inch forged steel armor-piercing shell containing 3 pounds and 3 ounces of emmensite: exploded in this manner, was completely shattered, 322 fragments being recovered.

The tests as to the keeping qualities of emmensite, which have been going on since June, 1890, have thus far shown no apparent change.

An experimental 11-inch mortar designed for firing high explosives has been manufactured from a 11-inch smooth-bore gun and installed for trial at the naval proving ground, Indian Head, Md. A number of projectiles have been made for this mortar each capable of holding about 100 pounds of emmensite or some other high explosives and fitted with fuses of a detonating mixture devised at the torpedo station. These will be propelled by a charge of powder with sufficient air space in the chamber to give a maximum pressure of about 8 tons per square inch, and a muzzle velocity of about 1,000 f.s. to the shell.

It is hoped thereby to demonstrate the feasibility of throwing large quantities of high explosives from powder guns safely and of detonating them on impact.

It is the Bureau's intention to recommend the adoption of a relatively short gun of large caliber, using powder as the propulsive charge and firing a projectile containing a charge of emmensite or gun cotton, for a feature of the armament of vessels with a view of utilizing either an aerial or submarine torpedo effect at ranges where the question of accuracy of fire is absolutely eliminated.

The report of Commander T. F. Jewell, in charge of the torpedo station, appended hereto, will be found to contain these and other experiments and researches described in greater detail.

ARMOR-PIERCING PROJECTILES.

No further orders for armor-piercing shell have been given, except one for one hundred 4-inch caliber for experimental purposes.

The deliveries under the contract with the Carpenter Steel Company, of Reading, Pa., have not yet been completed. All the 6-inch and about one-half the 8-inch shell under that contract have, however, passed the required tests and these calibers are now issued to ships as required.

A number of the 4-inch shell ordered from this company have also been used in experimental work with good results.

Besides this, a test has been made of 6-inch armor-piercing shell presented by the Sterling Steel Company and by the Redemann-Tilford Company, both with poor results. In the smaller calibers, tests made

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of 6-pounder armor-piercing shell made by electro-welding have shown promising results.

A definite progress in improvements in the quality of the projectiles received under the contract with the Carpenter Steel Company has been distinctly apparent since the commencement of deliveries, and it is gratifying to be able to note that this is due to the suggestions of the contractors themselves, who have in a measure abandoned the formula furnished by the foreign firm from which the Firminy methods were originally purchased.

No opportunity has occurred since the last report to make a positive comparison with Holtzer projectiles, which are considered as standard in Europe. It is probable, however, that the Carpenter projectiles nearly approach the Holtzer in quality.

COMMON SHELL.

The production of cast-iron common shell and shrapnel has continued at the Washington navy-yard as these projectiles have been required for ships and the proving grounds.

In the last report it was mentioned that the Bureau hoped to establish in the United States a new process of manufacturing forged steel common shell. Since then the Department has contracted with the United States Projectile Company, of Brooklyn, N. Y., for 15,200 shells and 3,000 shrapnel cases of 4, 5, and 6 inches calibers, all to be of forged steel made by the process referred to, the right to use which had been acquired by this firm.

The Bureau has besides this given an order to the American Projectile Company, of Boston, Mass., for 5,000 4-inch and 10,000 6-pounder shell, all to be made of steel tubing electro-welded to drop forged heads by a process owned by that company.

The production of steel common shell, which possesses considerable advantages over cast-iron ones, is now assured, for the smaller calibers at least, at a reasonable price and in quantities as great as desired.

For the larger calibers it is probable that cast-steel common shell will be used to a considerable extent.

The Bureau expects to domesticate in this country the methods employed by Messrs. R. A. Hadfield & Co., of Sheffield, England, which have been employed so successfully in the production of cast-steel shell. Negotiations looking to the acquisition of these by an American firm are now in progress.

The cost of cast-iron projectiles made at the Washington Gun Factory has been greatly reduced within the past year.

MOUNTS FOR MAIN BATTERIES.

The Bureau, finding itself without information touching certain important features of the proposed mounts for the heavier guns, notably those of the battle-ships, sent Lieut. F. F. Fletcher abroad to visit European factories, Government workshops, and ships in commission, etc., with directions to purchase any one European system which was found to be especially efficient.

Lieutenant Fletcher spent three months in Europe and received much attention at the hands of foreign officials and valuable aid and assistance from our naval attachés in London, Paris, and Rome.

Drawings of certain foreign mounts were purchased as studies and have proved of value to the Department. Much general information

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upon this subject was acquired by Lieutenant Fletcher, and it is believed that this feature of the ordnance outfit may be considered on the way to satisfactory development.

Lieutenant Fletcher's report will be found in the Appendix.

Work is progressing on the detail designs of the mounts for the 13-inch guns of the battle-ships. These guns will be controlled and worked by hydraulic power, there being independent recoil cylinders as in the Mark II 12-inch and Mark III 10-inch mounts.

One 12-inch mount of Mark I has been completed and will soon be tested. It is of the same type as the 10-inch Mark II mount and castings for six mounts of this design have been ordered from the Midvale Steel Company for the *Puritan* and *Monterey*. The 12-inch mounts of the *Texas* will be of Mark II, similar to the Mark III 10-inch mount. This design has an independent recoil cylinder.

The four 10-inch Mark I mounts of the *Miantonomoh* are installed on that vessel, which will soon test the efficiency of her ordnance outfit by firing practice. These mounts were the first designed and built for heavy guns of modern type in this country, and the experience gained in their construction and test has helped the Bureau to make a great advance in efficiency and simplicity in its later designs.

The first of the Mark II 10-inch mounts has been given a preliminary test at Indian Head with most satisfactory results. This mount is single cylinder hydraulic carriage, but much simplified from the original designs of the mounts now on the *Miantonomoh*.

The Mark II 10-inch mount will be placed on the *Amphitrite*, *Monadnock*, and *Monterey*.

The Mark III 10-inch mount, having an independent recoil cylinder, will be placed on the *Maine*.

Steel castings for six 10-inch mounts have been ordered from the Standard Steel Casting Company.

After much consideration, the Bureau has decided to mount the 8-inch guns of the battle ships, armored Cruiser No. 2, of 8,100 tons, and Cruiser No. 6, of 5,300 tons, all of which are in armored turrets, on gravity return carriages, with hand-working throughout. The great gain in simplicity of design with consequent decrease of liability to derangement in service, and the saving in weight thus effected, are the leading causes of this change. The new designs are well advanced, and as the general type of mount is one with which the Bureau has had much experience, no trouble is anticipated in providing an efficient installation of the 8-inch guns of the vessels referred to.

No trial has yet been had with the electric motor for controlling all the motions of the 8-inch gun, which was referred to in the last report as contracted for with the Edison and Thomson-Houston companies. A central-pivot 8-inch carriage has been prepared for the test of this motor, but neither company has yet presented one for trial.

The manufacture of both 8-inch and 6-inch central-pivot carriages with gravity return has continued without any considerable modification, these carriages having proved entirely satisfactory in service. Of this type seventy 6-inch and six 8-inch are in service. The experience gained in their manufacture, in service, and in proving-ground trials has, however, suggested some improvements in this type of carriage, and the Bureau intends to incorporate changes leading to greater facility of manipulation on such of these carriages as are to be issued to the battle ships.

Detail drawings are being prepared of a 6-inch carriage of the same general type as those adopted for the 4-inch and 5-inch rapid-fire guns.

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On this carriage, the gun recoils in the line of fire, being returned to battery by springs, and a very large range of elevation and depression is obtained. The Bureau proposes to use carriages of the rapid-fire type for the 6-inch guns of Cruisers 12 and 13, which, as before mentioned, mount guns of 40 calibers in length.

One 5-inch rapid-fire carriage has been completed and is on the firing ground for test. Steel castings for ten of these carriages have been ordered.

A second 4-inch rapid-fire carriage, with certain marked improvements over the first one built and referred to in the last report, has been tested with satisfactory results, and ten of these are in course of construction at the Washington gun factory. Steel castings for twenty of these carriages have been ordered.

The Bureau desires to express its sincere appreciation of the mechanical ability and the successful study devoted to this subject by Lieut. F. F. Fletcher, to whom is wholly due the admirable condition in which the Department finds itself placed with regard to the mounts of the rapid-fire calibers.

It is not thought that any motor power will be advantageous in the results for guns below 8 inches in caliber, but the mounts for the 4, 5, and 6-inch rapid-fire guns are arranged so as to be easily fitted with electric motors if desired.

The subject of mounts for large guns has been ably handled by Lieut. A. McCrackin and Ensign T. C. Fenton. The former having been detached from the Bureau and ordered to sea, the latter will now have sole charge of this branch of the Bureau's work.

SECONDARY BATTERIES.

The Hotchkiss Ordnance Company having completed the delivery of guns previously ordered, one hundred and twenty in all (with the exception of two 6-pounders), has been given further orders for twenty-five high-powered 1-pounders, and fifty 6-pounders of increased length. All the common and most of the steel shell ordered under the original contract and since have been delivered, the difficulties in the manufacture of the latter having been finally overcome.

A marked reduction in the price of guns and ammunition of all calibers of the rapid-firing variety has been accomplished by permitting a healthy competiton between the various companies which manufacture this particular material.

In June last the first of the Driggs-Schroeder 6-pounder guns ordered October 11, 1889, having been delivered, was submitted to the endurance tests required by the contract. In the following month it was given a further test, firing ninety-four rounds in 22 minutes. Both tests were passed successfully, and a further order for seventy-five of these guns was then given to the Driggs Ordnance Company. No deliveries of 1-pounder or 3-pounder guns have yet been made by this company, and deliveries of ammunition are just beginning.

There still remain to be ordered to complete the secondary batteries of vessels authorized by law thirty-three 1-pounder and thirty-five 6-pounder guns.

A recoil carriage, on the same system as those for 3 and 6-pounders, has been designed and manufactured for the new high-power 1-pounders, and will be tested when a gun is delivered by the manufacturers. Twenty-five of those carriages are being made at the Washington Navy-yard.

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Thirty-three 3-pounder recoil carriages have been issued to service, and 10 more are in course of construction. Thirty-nine 6-pounder recoil carriages have also been issued to service and 60 more are being made.

Greater uniformity and simplicity have been established in the matter of secondary battery mounts by making all guns interchangeable as far as practicable. Thus the Gatlings, 1-pounders and 37-millemeter revolving cannon, mounted on the ship's decks, on her rail, in tops, or in boats, are all interchangeable, and can be transferred from one position to another to meet varying conditions of service. The 3 and 6-pounders are also interchangeable, the same stand taking either.

Experimental firing for various purposes with the secondary battery guns upon their mounts has continued during the year at both proving grounds and on ships in commission. No defects have been developed, and the system of recoil mounts for rapid-fire guns may now be considered well developed. It is a valuable feature that this one system is equally applicable to all guns from the 1-pounder to the 6-inch gun with a projectile of 100 pounds.

The Bureau desires to urgently recommend the acquisition by the Ordnance Department of a suitable vessel for testing at sea the mounts of the rapid-fire calibers, particularly of the 4, 5, and 6 inch guns.

It is considered absolutely necessary to make certain tests incident to an unstable platform prior to the issue of these to the service.

MACHINE GUNS AND SMALL ARMS.

During the year the progress of rearming with the reduced caliber small arm in European countries has been closely observed. Smokeless powders, suitable for use in the new rifles, have been improved to a point where they give fairly satisfactory results in the field, and a general adoption of the reduced caliber seems now assured.

The Bureau's experiments with the Naval Torpedo Station smokeless powder give assurance that there should be no further delay in arming the Navy with a rifle of the most approved type now produced, and its action in the matter is only prevented by the necessity of awaiting the determination by the Ordnance Department of the Army of the dimensions of cartridge to be adopted for use by that branch of the service. It is considered advantageous that the small-arm ammunition of the Army and Navy be interchangeable, and a speedy settlement of the question of its dimensions is most desirable.

The Gatling gun has of late been greatly improved by the adoption of a positive feed, by means of which the cartridges are fed directly from the packing cases without the necessity of filling feed cases in the field. The Bureau has arranged for the acquisition of one of these improved Gatlings, which as yet are only manufactured by an English firm, and will give it a thorough trial.

A further improvement has been suggested in the use of an electric motor for operating the Gatling gun in place of hand power, when mounted on board ship, by which it is hoped to simplify the application.

In view of the reports which have been received from service the Bureau is not entirely satisfied with the efficiency of the double action system, which forms a feature of the naval revolver. The principle of self-cocking has apparently advantageous elements, but it is considered that the liability to accident is greatly enhanced thereby, and for this reason it proposes, in the purchase of future supplies of this arm to eliminate the double action. In this the practice abroad is adhered to.

The entire subject of the manufacture and inspection of rapid-fire

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guns of calibers below 4 inches, of machine guns, small arms, and the ammunition for the entire secondary armament, is in charge of Ensign H. H. Eames, U. S. Navy, with headquarters at Hartford, Conn., and subinspectorships at New Haven and Bridgeport in the same State, and at Lynn and Fitchburg, Mass. The intelligent zeal, energy, and thoroughness which this officer has applied to his work have been of great value to the Bureau.

TORPEDO BOARD.

The general subject of torpedo outfits, extending over a very large field and comprising torpedoes, torpedo cruisers and boats, submarine vessels and guns, and torpedo defense nets, has assumed so much importance that the Bureau has considered it desirable to appoint a board of officers which shall be specially charged, under the Bureau of Ordnance, with all details concerning this feature of the armament. Commander G. A. Converse, whose extensive experience and well-known attainments in this direction render him peculiarly fitted, has been appointed president of the Board, and has associated with him as members Lieut. C. A. Bradbury, an attaché of the Bureau of Ordnance, and the inspectors of ordnance in charge of the manufacture of auto-mobile torpedoes at Providence, R. I., and Brooklyn, N. Y., Lieuts. F. J. Drake and T. C. McLean, respectively.

The questions regarding the installation, stowage, distribution, etc., are being rapidly settled by this Board, following the most approved European practice, and it may be expected that with the manufacture and delivery of torpedo supplies the Bureau will find itself in possession of the necessary technical data and apparatus for their successful operation as a part of the regular outfit.

AUTO-MOBILE TORPEDOES.

The Bureau has fully realized the necessity of supplying the new vessels with torpedoes of the most efficient type, and has been unremitting in its efforts to accomplish this result without unnecessary loss of time. The delay of the Hotchkiss Ordnance Company, with which a contract for the Howell torpedo was made January 5, 1889, to produce a trial torpedo within the specified time, and the fact that the Hall torpedo, for which a special appropriation was made June 30, 1890, was as yet experimental and undeveloped, led the Department to enter into negotiations with the proprietors of the most successful torpedo built abroad, viz, the Whitehead torpedo, with a view of domesticating its manufacture. The result of these negotiations was most satisfactory, and an experienced and well-established firm in Brooklyn has acquired the right to manufacture the weapon in this country.

In all torpedoes in which air is used as the motive power the flask or air vessel forms a most important feature, the requirements being great strength, extreme lightness, and the absence of porosity. Knowing the difficulties which had been experienced abroad in procuring a suitable air vessel, and which had only been overcome after repeated failures, the Bureau has taken the matter in hand, and at present trial air vessels are being made of steel by the Bethlehem Iron Company and by the Carpenter Steel Company; of aluminum bronze by the Aluminum Brass and Bronze Company, of Bridgeport, Conn.; and of manganese bronze by B. H. Cramp & Co., of Philadelphia, Pa. From experiments already made, the Bureau has every reason to expect that

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it will soon be able to obtain air vessels which will equal the best products abroad.

THE HOWELL TORPEDO.

Owing to the loss of several torpedoes during the preliminary trials and to difficulties encountered in the development of the weapon, the Department has granted an extension of the contract time for delivery to November 30, 1891.

The experience gained in former trials has led to the remodeling of the torpedo in many respects, and the new type is much superior to the old. Experiments now in progress give assurance that the torpedo will soon be ready for its official trials.

THE HALL TORPEDO.

This torpedo is being made at the naval torpedo station, Newport, R. I. The working drawings have received the approval of the Bureau, and all parts of the initial torpedo are now completed and ready for assembling, except the air vessel. The completion of the torpedo after the flask is received will be a matter of a few weeks' work.

THE WHITEHEAD TORPEDO.

The E. W. Bliss Company, of Brooklyn, N. Y., having acquired the patents, working drawings, and models of the Whitehead torpedo and launching apparaatus, and having prepared a suitable plant for their manufacture in this country, the Department entered into a contract with them on the 19th of May last for 100 18-inch torpedoes of the most recent type. Under the contract the first torpedo is to be ready for trial November 30 next, and, if found satisfactory, the remainder are to be delivered at the rate of ten per month. From progress already made, there is reason to believe that there will be little or no delay in having the trial torpedo ready at the appointed time.

LAUNCHING TUBES.

The launching tubes for the Howell torpedo have been developed, and ten of them, the number called for under the contract with the Hotchkiss Ordnance Company, have been practically completed. By the terms of the contract no launching gear can be accepted until one torpedo and its tube have fulfilled all the conditions of the specifications. Should the torpedo now undergoing trial be successful, these tubes will be at once installed on vessels now in commission.

Working drawings of launching tubes for the 18-inch Whitehead torpedo, for both powder and air impulse, have been prepared, and the Bureau is about to place an order for enough of the various kinds to meet the present needs of the service.

The present state of work, in connection with auto-mobile torpedoes and their accessories, is such as to justify the belief that the installation of outfits on board vessels will commence early in the coming year, and that our Navy will soon be equipped with torpedo outfits equal, if not superior, to those possessed by foreign nations.

DIRIGIBLE TORPEDOES.

The Patrick torpedo.—Of the three torpedoes of this type ordered from Mr. J. N. H. Patrick, in February, 1889, one was delivered last

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year, and the remaining two were submitted for final test on the 5th of October.

These torpedoes are now at the torpedo station at Newport, and it is the intention to so distribute them that they would be useful in emergencies and will also be available for instructional purposes.

The Sims-Edison torpedo.—The Bureau believes that it would be advantageous to the Navy were it to acquire a torpedo of this type for experimental and educational purposes. Correspondence has been opened with the company controlling its manufacture, but the price asked is in excess of the funds at the disposal of the Bureau.

SUBMARINE GUN.

The Department, under the authorization of the act of Congress of June 30, 1890, entered into a contract, under date of September 19, 1890, with the Ericsson Coast Defense Company for one 16-inch submarine gun and six steel projectiles to be placed in position on board the *Destroyer* for a thorough test of the system.

The work under this contract having been greatly delayed by the failure of subcontractors to complete the gun, the Bureau has undertaken this work and is now finishing the rear section of the piece at the Washington gun factory. The expense of this work, which will have been completed by the end of October, will be borne by the contractors.

The experimental tests will be conducted by a board of naval officers appointed by the Department, and in case they are successful the Department has an option to purchase the right to use the system at a price fixed by the contract. In case of an unsuccessful test, the gun and projectiles are to be turned over to the Department for such use as it thinks best.

A further consideration of the subject of submarine artillery, which has been rendered possible by the approaching completion of the experimental type gun, inclines the Bureau to the belief that it will prove a valuable and important adjunct to our defensive armament, particularly when mounted on board of vessels intended especially for ramming. It seems probable that the chances of the ram being able to reach her antagonist with destructive effect will be quadrupled by the addition of this weapon to her means of offense.

TORPEDO DEFENSE NETS.

A section of a torpedo defense net has been made by the Midgley Wire Belt Company, of Beaver Falls, Pa., which in point of weight, flexibility, and convenience of stowage compares favorably with other types of nets used abroad.

A similar section of net of the most approved foreign type has been procured, and it is the intention of the Bureau to test the relative merits of the two nets under service conditions as soon as the Ericsson submarine gun is available. The result of these experiments is awaited with great interest.

Negotiations with a view to acquire the patent rights of the Bullivant net are now pending between that firm and an American firm of good reputation.

TORPEDO BOATS.

The *Stiletto* has recently had a new boiler put in, and is now in good, serviceable condition. A launching tube of the Hotchkiss type is now mounted on deck for the trial of the Howell torpedo, and plans for fit-

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ting a tube in the bow have been prepared. When this is done, the boat will be a good second-class torpedo boat, and will be most useful in conducting trials and drilling crews in the use of the Howell torpedo.

The Cushing.—Plans have been prepared for mounting one tube in the bow of this boat, and two tubes on a turntable on deck. As the relative merits of parallel and diverging fire are yet to be determined, it is proposed that the two deck tubes shall be adjustable.

The desirability of having boats fully prepared and equipped for experimental work during the final development of the torpedo outfits is apparent.

The specifications under which the torpedoes are being constructed require that the course of the torpedo shall be accurate within certain prescribed limits, "when fired in any direction from a vessel going at a speed of 18 knots or less."

It is also the intention to use these boats for the purpose of determining certain data required for the preparation of a book of instructions and drill to be supplied to the general service.

SUBMARINE BOATS.

The Bureau has carefully noted the progress which has been made in the different countries in the construction of the submarine boats. One recently used during torpedo maneuvers in France is said to have been most successful. The recent progress and development in storage batteries and electric motors encourage the belief that electricity can be utilized for submarine navigation, thus greatly simplifying the problem. The Bureau desires to suggest the advisability, in the near future, of inviting plans and proposals for building a submarine boat which would be adapted to naval purposes.

ARMOR CONTRACTS.

The plant for the manufacture of armor to be established by the Bethlehem Iron Company, of South Bethlehem, Pa., under their contract of June 1, 1887, with the Navy Department has been completed during the year and all parts are now in operation.

Certain small lots of armor for the *Maine* and *Texas* have been manufactured under this contract, and the armor of the *Maine* and *Terror* are in course of manufacture.

The Bureau has, with authority of the Department, entered into negotiations looking to the furnishing by the Bethlehem Iron Company of nickel steel instead of simple steel armor for the *Amphitrite*, *Monadnock*, *Puritan*, *Maine*, and *Texas*, all of which are to be supplied with armor under their contract.

The barbette armor of the *Monterey*, for which a special order was given to the Bethlehem Iron Company, has been manufactured and a selected plate will shortly be submitted to the ballistic tests required before acceptance of the lot of armor it represents.

For the past four years, since the beginning of the establishment of the plant for the manufacture of gun steel and armor, Lieutenant Kossuth Niles, U. S. N., has been the Bureau's inspector at the Bethlehem Iron Works. He has also been the Bureau's inspector of the armor-piercing shell manufactured by the Carpenter Steel Company at Reading, Pa.

The zeal and intelligence displayed by Lieutenant Niles in the important position which he has held merits special commendation, and

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the Department has greatly profited by his careful attention and thorough knowledge of all the details of the operation coming under his supervision.

On November 20, 1890, the Department entered into a contract with Carnegie, Phipps & Co., for 6,000 tons of armor plates and appurtenances, deliveries to begin on July 1, 1891, and to be completed in one year from that date.

Under this contract the company are bound to furnish and maintain the most improved modern plant for the production of first-class armor and to conduct it according to the best methods. The armor bolts, etc., to be supplied are to be ordered from time to time, as needed, the prices paid being those which would be paid for similar articles under the Bethlehem contract. The Department may require any or all of the armor ordered under this contract to be of nickel instead of simple steel, if this be found desirable.

The time required for the necessary extension of their existing plant has been found to be much greater than was anticipated by the company, and although some experimental plates have been produced, no deliveries under the contract have yet been made.

The results of tests of nickel steel plates described under the head of armor trials have been such as to convince the Department of the desirability of armoring the new ships with this material, and accordingly, all the armor ordered from Carnegie, Phipps & Co., is to be of nickel steel. About 3,500 tons of armor have thus far been ordered under this contract and its manufacture has at present actually been started.

The Department supplies the nickel for this armor in the form of nickel oxide, about 900 tons of which have been bought with the money appropriated last year for that purpose.

Lieut. Commander A. R. Couden, whose services in the original preparation of the armor contracts are remembered, has charge of this branch of the Bureau's work, and has applied to all its details his well recognized ability and capacity.

ARMAMENT OF NEW VESSELS.

Since the last report the armaments of the *Miantonomoh*, *Newark*, *Concord*, and *Bennington*, and the 8-inch guns of the *Charleston* have been installed.

The Department has directed that the main battery of the *Dolphin* be changed by substituting in lieu of the 6-inch gun at present installed on board that vessel, two 4-inch rapid-fire guns.

The completion of the *Bennington* before the development of the 5-inch rapid-fire guns caused the Department to adhere to the original plan of her battery, *i. e.*, six 6-inch guns.

The 10-inch guns of the *Terror* are completed and will be installed on that vessel whenever she is ready to receive them.

The 10 and 12 inch guns of the *Monterey*, with their mounts, are well advanced and will also be ready for installation when required.

The needs of the service having caused the Department to send the *Lancaster* abroad with her old battery, the Bureau proposes to retain the 8-inch gun and carriage manufactured for her and put them to such use as seems best in the future.

In May last took place the service trials of the dynamite guns of the *Vesuvius*. They were conducted by a board of naval officers of which Commander R. D. Evans was president, in accordance with a programme

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drawn up by the Department. Failure of the gun-working valves of the middle and port guns prevented a proper test of their accuracy, but the starboard guns, the valve of which had been modified by Lieutenant Schroeder, the commanding officer of the *Vesuvius*, worked satisfactorily, and the board considered its accuracy of fire as good under the circumstances of the trial.

The effect of a moderate sea and wind on the general efficiency of the gun was found by the board to be slight and the vessel is said to have behaved satisfactority as a gun platform. The appliances fitted for loading and firing the guns and for steering and controlling the vessel were considered by the board to be crude and capable of great improvement.

The small number of projectiles available rendered this trial inconclusive and a further and more extended test will soon be made after the changes recommended by the board have been made and a new supply of projectiles has been obtained.

The bankruptcy of the Dynamite Gun Company renders it impossible to fix a date for this trial, which must wait until the company is able to furnish projectiles unless the Department itself undertakes their manufacture, and the Bureau desires to recommend that this course be adopted.

While the report of the board of officers of the accuracy of the guns of the *Vesuvius* leaves the question still in grave doubt whether the system is of any value, it is nevertheless highly improbable in the nature of things, due weight being given to the effect of the movements of the gun platform or of a strong cross wind blowing, that they are effectively accurate.

The Bureau considers this vessel in no respect fitted as a gun platform for artillery of this description, even if the latter proved of any military value. It will be readily appreciated that unarmored as the *Vesuvius* is, her stores of high explosive, and a large portion of the length of her guns are completely exposed to the fire of rapid-fire ordnance. The effect of a single shell, from the 1-pounder in her magazine of high explosives may be imagined.

The vessel, as is well known, possesses only indifferent steering qualities, and this being the case, it is probable that two torpedo boats of the type of the *Cushing* armed with an auto-mobile torpedo and with rapid-fire guns of smaller caliber would very much overmatch her. It is considered, therefore, that the question of the value of the guns for war purposes should receive an early conclusion.

It is believed that the range of efficiency of the *Vesuvius* would be greatly increased by turning her into a torpedo cruiser. Her displacement is such that, with her dynamite guns removed, and a battery of considerable power placed for fore and aft fire, supplementing the larger calibers of rapid-fire guns with a number of 6-pounders this vessel would then become a formidable antagonist for any of the unarmored types.

The assignment and classification of all ordnance material for the vessels now building and the preparation of estimates and publications for the Bureau have been intrusted to Lieut. A. E. Culver, and his industry and thoroughness merit the Bureau's commendation.

MONITORS.

The Bureau, having in view the necessity of utilizing the old monitors in ordinary in the James River, near Richmond, Va., has caused designs to be made of new turrets for these vessels, mounting two

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8-inch guns and not exceeding in weight their present armament. As an alternative, the Bureau proposes to mount a single 10-inch B. L. R. in the present turrets of these monitors, and three 10-inch guns, which are already available, will be held in reserve for this use should it prove at any time desirable. The adoption of either of these plans would make a considerable addition to the defensive forces of the United States at small expense and in a short time.

GUN FORGING CONTRACTS.

The Bethlehem Iron Company has delivered all the gun forgings contracted for May 1, 1887, excepting those for six 10-inch guns, and has commenced deliveries under the contract of November 8, 1890. The sets of forgings thus far delivered by this company are as follows:

4-inch	10
5-inch	2
6-inch	51
8-inch	13
10-inch	16
12-inch	4

There remain to be delivered the following sets of forgings:

8-inch	14
10-inch	6
12-inch	4
13-inch	12

The extension of the tempering plant necessary for producing the 13-inch gun forgings for the battle ships has been completed and the delivery of the first tube and jacket for this caliber is very soon to be made.

In April last the Bureau advertised for bids for forgings for two 6-inch guns of 40 calibers, three 8-inch guns of 35 calibers, and one 8-inch of 40 calibers, these being necessary to complete the batteries of ships authorized by law. The Midvale Steel Company being the lowest bidders received an order for these forgings. All forgings ordered from this company, excepting the 8-inch, have been shipped and deliveries of the latter have begun.

The extension of plant of this company for the manufacture of heavier gun forgings than had before been undertaken was mentioned in the last report as being begun. This extension is now completed, and provides a second source of supply of heavy gun forgings.

The Midvale Steel Company has thus far furnished the Department with the following sets of forgings:

4-inch	25
5-inch	27
6-inch	83

There remain to be delivered sixteen sets of 8-inch forgings.

GUN FACTORY.

The devolopment of the plant at the Washington Gun Factory has continued during the year. The 110-ton crane has been completed and is in operation. A new fast-traveling 15-ton crane has been erected in the gun shop on the 40-ton crane supports, and these have been extended through the north gun shop to increase handling facilities. The new office building has been completed and is occupied.

The galleries of the gun shop have been equipped with machine tools

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for small work, and a 100 horse-power Armington and Sims engine for supplying power to this plant has been purchased and erected. A furnace for treating armor plates by the Harvey process has been erected and several plates have been treated for experimental trial. A chemical laboratory has been established and equipped and is doing valuable work for the Bureau.

The foundations have been built for the large gun lathes contracted for with Wm. Sellers & Co., of Philadelphia, Pa., and the delivery of the first of these lathes is expected in January next, in accordance with the terms of the contract.

The Bureau has purchased from Messrs. Bement, Miles & Co., of Philadelphia, Pa., a second large lathe suitable for 8 and 10 inch guns, which is a valuable addition to the plant. It is probable that this is at this date the the finest tool of its kind in the United States.

It has also purchased and installed a large amount of machinery for the manufacture of the breech mechanisms, mounts, etc., for the rapid-fire guns.

In view of the prominence in modern armament of the larger calibers of rapid-fire guns and mounts, the Bureau in its estimates urges the appropriation of a sum of money for the completion of the plant in this specific feature. Our facilities have been developed in the direction of the heavy work to a satisfactory extent, and it is improbable that further calls will be made upon Congress, but there are many smaller details which are of equal importance with the larger tools that should receive generous consideration.

The principal work done at the gun factory during the year has been the manufacture of guns and their mounts, but a great deal of experimental developement has been carried on.

In addition to the current production, the gun factory has manufactured a 6-inch and an 8-inch gun with carriages for the Bethlehem Iron Company, and a 6-inch gun and carriage for Messrs. E. I. DuPont & Co.

A 60-ton crane for use in handling heavy guns at Indian Head was built by the Bureau at a total cost of $5,462.41, the price asked for the manufacture of this crane having been $15,660 when bids were called for from private firms.

The Bureau has recently decided to adopt a system of heated air, which has been found so successful abroad in assembling guns, and the necessary changes in the shrinking pit are at present in progress. All the requisite material to effect this change has been manufactured at the Washington navy-yard.

The ordnance department of the navy-yard at Washington has remained under the efficient, painstaking, and conscientious charge of Commander Charles O'Neill, U. S. Navy, whose successful efforts the Bureau desires to bring to the special notice of the Department. His interesting annual report will be found appended.

The wisdom of the adoption of the system of giving personal control of the various operations of the manufacture at the yard to line officers of the Navy has been thoroughly established by the past three years' experience, and the result has been a decided gain in economy and thoroughness of inspection, which has received the notice and commendation of many visitors, including foreign officials familiar with the workings of similar establishments abroad.

In addition to and as a consequence of the naval control above described, a large corps of officers is being instructed and go forth to the service having acquired valuable experience and knowledge in the science of mechanical engineering. The effects of this experience will

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be definitely apparent in a few years in the increased efficiency with which their naval duties will be performed where those are connected with the mechanical appliances which now form so large a feature in the outfit of modern vessels.

An example directly illustrating this is furnished in the case of Lieut. Commander Swift, who, at the original establishment of the new plant at the gun factory, was in sole charge of the installation of the machinery. He has since the completion of this duty been employed, while on leave of absence, by Messrs. William Sellers & Co., in charge of the construction at their works in Philadelphia of all the lathes intended for the gun factory.

The Bureau recommends, as important for the Department's consideration, that all line officers off duty should be afforded facilities for the study of gun construction at this station.

In this connection the Bureau desires to favorably notice the services of Lieuts. J. L. Chamberlin and J. T. Thompson, of the United States Artillery, who have been doing duty at the Washington gun factory during the past year upon their own application, at the request of the honorable Secretary of War, for the purpose of acquiring experience and knowledge of modern ordnance construction. Both these officers have performed duties such as are assigned to the naval officers stationed at the Washington gun factory and have rendered efficient assistance to the inspector of ordnance in charge. Lieut. Thompson was detached from this duty some months since, having been appointed to the Ordnance Corps of the Army. The intelligent zeal and industry of both these officers have been brought to the notice of the Bureau by the inspector of ordnance in charge.

It is perhaps unnecessary to state, and it is a fact which is generally acknowledged, that the gun factory at the Washington navy-yard has proved itself successful in the direction of economy and efficiency. Ordnance material of every description is now manufactured in this establishment cheaper than outside contractors will agree to undertake the work. This state of affairs is largely due to the methods which have been pursued in purifying the manner of making appointments, promotions, etc., in the labor force, and in the adoption of an administration based upon business methods, and it is believed that the merit system, which has become finally established, is satisfactory and beneficial both to the Government and to the labor employed.

NAVAL ORDNANCE PROVING GROUND, ANNAPOLIS, MD.

The Naval Ordnance Proving Ground, at Annapolis, Md., has remained under the charge of Lieut. Commander J. H. Dayton, U. S. Navy, and much important work has been accomplished during the past year, particularly in the direction of the development of special material intended for armor plates, and in the tests connected with the reception of armor-piercing projectiles under the contract with the Carpenter Steel Company, of Reading, Pa. The proof of guns, for both main and secondary batteries, and tests of samples of powder, have been made at this station, as well as the prosecution of experiments with gun cotton, emmensite, and, to a limited extent, with smokeless powder.

Numerous other trials and tests have also been made.

It is proposed to entirely close the station at this place, and completely abandon it for proving purposes before the end of the present calendar year, and to this end the Bureau has lately withdrawn much

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material and apparatus and transferred them to the naval proving ground at Indian Head, Md., where more advantageous facilities exist for the service heretofore required of the former station.

The multifarious operations which are incident to the peculiar character of duty at this station, and which cover a very wide field, have been performed under the personal direction and immediate supervision of the officers attached thereto, and the Bureau desires to note its high appreciation of the thorough, painstaking, and efficient work which has been so successfully done by Lieut. Commander Dayton and his assistants.

The report of Lieut. Commander Dayton will be found appended.

NAVAL PROVING GROUND, INDIAN HEAD, MD.

Since last report marked progress in the installation of modern facilities for the test of ordinance material has been made at the naval proving ground, Indian Head, Md.

The marsh in the valley has been drained; a sea wall of piles has been built, inclosing the water front, of a height several feet greater than the highest freshet record; a railroad has been built for the traveling crane and flat cars, connecting the wharf and slip with the velocity and range and armor batteries; a firing butt has been finished and is in satisfactory operation; and the necessary apparatus for measuring velocities are in working order.

Gun platforms for all calibers from the smaller rapid fire to the 12-inch gun have been erected and are in readiness for work; three bomb-proofs have been completed; a large boiler and hydraulic pumping plant have been installed; the chronographs and their circuits have been set up; roads have been constructed where necessary; and a chronograph house, magazine, storehouse, stable, and other necessary buildings have been erected.

By reason of the inaccessibility of this station and the lack of suitable accommodations in its vicinity, it has been found necessary to erect three cottages for use as officers' quarters, which have been completed and are now occupied by the inspector of ordnance in charge and his assistants.

Three target structures for the tests of the new American armor plates have been put up and are now ready for use in the trials. A heavy curved face structure has also been erected for the reception tests of barbette armor. Preparations have been made and are now nearly completed for the reception tests of armor-piercing projectiles.

A scow, designed by Ensign Dashiell, has been built, and is being used for the transportation of material from the Washington navy-yard to this station.

A steam launch has also been purchased for the use of the station.

The necessity for telegraphic communication with this place is very apparent when it is considered that it is only 22 miles distant from this city, the nearest post-office being at Glymont, Md., and that it frequently requires as long as forty-eight hours to communicate with the station by mail.

It is therefore earnestly requested that an appropriation may be made for running a special telegraphic wire from the Navy Department to Indian Head direct, and an item for this is included in the Bureau's estimates for the current year, and is urgently recommended.

Among the important and valuable features of the proving ground at Indian Head, Md., the Bureau will mention the railway crane devised

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by Ensign Dashiell and manufactured at the Washington navy-yard. With its use it is possible to send guns of 8-inch caliber and below from the Washington navy-yard to this station, prove, and return them to the yard the same day, resulting in great economy and dispatch.

It will be frequently advisable and necessary for the Department to order boards of officers to witness and report upon trials of guns, armor plates, etc., at Indian Head, and such work would be greatly expedited by making some provision to enable these boards to remain over night on the proving ground. It is recommended, therefore, that a suitable building be erected for the accommodation of officers and others whom the interests of the Department require to visit the Indian Head proving ground.

All the engineering features of every description, and all the other work connected with the change from a marshy valley, covered with undergrowth, into a proving ground and testing station complete in all respects and fitted with first-class facilities, have been under the charge of Ensign R. B. Dashiell, U. S. Navy, and the Bureau can not speak too highly of this successful undertaking.

The first gun, a 6-inch B. L. R., was proved at this station January 24, 1890, and since this date the Bureau has been conducting experiments with reception tests of powder, armor, and in the development of new material for the same, and the proof and tests of all guns and mounts.

The report of the inspector of ordnance in charge of this station, Ensign R. B. Dashiell, is appended hereto.

ARMOR TRIALS.

Shortly after the armor trials of September, 1890, in which the superiority of steel over compound armor was demonstrated, and that of nickel steel over simple steel armor indicated, it was reported that nickel steel became brittle at low temperatures and was thus unsuitable for the armor of ships. To test this point the Bureau fired two more 6-inch Holtzer armor-piercing projectiles at the Creusot nickel-steel plate, the first when the plate was at normal temperature and the second when it had been cooled by a freezing mixture to 28° F. No difference in the resistance of the plate was indicated, and the inference drawn was confirmed by the result of subsequent physical tests in which a temperature as low as that of freezing mercury was reached. The small 6-inch steel plate treated by the Harvey process, which resisted 6-pounder armor-piercing shell so successfully, as described in last year's report, was next tested, firing a 4-inch steel shot against it with 1,900 foot seconds striking velocity. The depth of indent was only 1¼ inches, but the plate was badly cracked.

In February last took place the test of the Creusot 10½-inch steel plate, which had been treated by the Harvey process at the Washington navy-yard. The plate was attacked by seven 6-inch armor-piercing shell, three Holtzer and four Carpenter, fired from a 6-inch gun of 35 calibers, the striking velocity being 2,065 foot seconds. The greatest penetration was 4 inches, except in one round, that at the center of the plate, where the point of the shell reached the backing. All the projectiles were broken up. The plate was cracked, but until the last round none was detached from the backing; at this round about one-eighth of the plate fell to the ground. These results are remarkable and indicated to the Department a probability that in this treatment had been found the means of producing the ideal armor plate, a hard front com-

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bined with a tough back without any weld or other line of demarkation between the two. The Department thereupon decided to hold a further series of armor trials, in which the relative merits of simple and nickel-steel and of the same when treated by the Harvey process should be submitted to exhaustive trial and competition. Accordingly eight plates, each 6 feet by 8 feet by 10½ inches were ordered, five from Messrs. Carnegie, Phipps & Co. and three from the Bethlehem Iron Company, and it was determined to test these plates at the Indian Head proving ground under the supervision of a board of naval officers, of which Rear-Admiral Kimberly was president.

In the meantime further experiments with thin plates, supplied by Messrs. Carnegie, Phipps & Co., were conducted at the Naval Ordnance Proving Ground at Annapolis, as follows:

In May five plates 6 feet by 8 feet by 3 inches were tested. Two of these plates were simple steel, 0.51 per cent and 0.62 per cent carbon; and three were of nickel steel, 0.51 per cent carbon, 3.12 per cent nickel; 0.40 per cent carbon, 3.15 per cent nickel; and 0.30 per cent carbon, 2.53 per cent nickel. The 0.51 carbon simple steel and the 0.51 per cent carbon nickel steel plates had been treated by the Harvey process at the Washington navy-yard. Twenty-one 6-pounder armor-piercing shell of French manufacture were fired with a striking velocity of 1,804 foot seconds at each of the plates, except the 0.62 per cent carbon simple steel plate, which was used up by ten shots. The results shown by the nickel steel Harvey-treated plate were phenomenal; the shell being shattered against it without indenting its surface more than from one-eighth to one-fourth of an inch. This plate was then attacked with three 4-inch armor-piercing shell with striking velocity of 1,800 foot seconds. The plate was perforated by two of these shell; but little cracking resulted, and all the shell were broken up. The five plates were placed in order of merit as follows: (1) Nickel steel Harveyed; (2) nickel steel (0.40 carbon and 3.15 nickel); (3) simple steel Harveyed; (4) nickel steel (0.30 carbon, 2.53 nickel); (5) simple steel.

In July two more simple steel 3-inch plates, containing only 0.25 carbon, were Harveyed at the Washington navy-yard and submitted to the same tests as above, except that American armor-piercing shell were used, having proved superior to those of French make. No cracks were developed by the firing and the indents were only from 1 inch to 1¼ inches deep.

Considering the fact that the 6-pounder armor-piercing shell will easily perforate a simple steel plate 3 inches thick, the resistance of the plates above described can well be called phenomenal.

The peculiar properties of nickel steel seeming to be of special value in protective deck plating, the Bureau in September last instituted a comparative test of simple and nickel steel plating at Indian Head. The targets consisted of two 1¼-inch simple steel plates, one over the other, and two 1½-inch nickel steel plates, also superimposed, both secured by through bolts to a 6-inch oak backing, the angle between the plates and the line of fire being 22 per cent. These targets were first each attacked with five 6-inch common shell, the striking velocity being 1,515 foot seconds. The simple steel plates were somewhat cracked and much more deeply indented than the nickel plates, which remained practically uninjured. Each target was then attacked by a Carpenter armor-piercing shell, the angle of impact remaining 22 per cent, but the striking velocities being increased to 1,780 foot seconds for the simple steel, and 1,875 foot seconds for the nickel steel. The result was,

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perforation of the simple steel target, a jagged hole 12 inches by 15 inches being made through both plates and the backing, and both plates being badly cracked, while in the case of the nickel target, although the striking velocity was 100 foot seconds greater, the shell was thrown off, and though the plates were somewhat cracked the backing and structure remained uninjured.

In consequence of these results the Department at once ordered the protective decks of all ships building to be of nickel steel, thereby greatly increasing their defensive powers.

The tests of the experimental 10½-inch plates ordered from Bethlehem Iron Company and Messrs. Carnegie, Phipps & Co. took place on October 31 and November 14, 1891, at Indian Head, Md.

The target structures were practically the same as those of last year's trials, the backing being in all cases 36 inches of oak. The guns used were a 6-inch B. L. R. of 40 calibers and an 8-inch B. L. R. of 35 calibers length of bore, the first firing Holtzer armor-piercing shell of 100 pounds weight with a striking velocity of 2,075 foot seconds, and the latter firing either 210-pound Firminy shell with 1,850 foot seconds striking velocity or 250-pound Carpenter shell with 1,700 foot seconds striking velocity, the energy being the same with either 8-inch shell.

Six plates only were fired at, two of the Carnegie, Phipps & Co.'s plates being withdrawn on account of defects in manufacture.

Each plate received four 6-inch shell, one at each corner, and an 8-inch shell in the center, the test being thus exactly the same as that of last year, except that two of the 8-inch shell were Carpenter shell instead of all being Firminy.

The three Bethlehem plates were, respectively, a high carbon nickel steel, a medium carbon nickel steel Harveyed, and a simple steel Harveyed plate. The three Carnegie, Phipps & Co. plates were, respectively, a high carbon nickel steel, a low carbon nickel steel, and a low carbon nickel steel Harveyed plate. All the plates showed greater resistance to perforation and less cracking than did the English compound plate of last year. Two of the plates showed greater resistance to perforation and less cracking than did the most resisting plate of last year, the all-steel, and, considering everything, were better plates than either the Creusot nickel or the all-steel plate of the earlier tests.

The results furnished by the nickel steel plate treated by the Harvey process manufactured by the Bethlehem Iron Company were most remarkable. It is unlikely that two of the shots obtained more than 3 inches of penetration. The points of none of the projectiles reached the rear surface of the plate.

At the back of the plate opposite the two impacts mentioned above the effects were nil, there being no rupture of the surface and no bulge of a greater height than perhaps one-quarter of an inch.

The cracking on the softer side of the plate was unimportant.

In conclusion, the Bureau considers that two important results have been achieved: first, a better plate, of American manufacture, has been produced than the Department was able to purchase abroad a year ago; secondly, it has developed a new principle in the manufacture of armor, of American origin, which there are good grounds for believing will furnish greater protection to the vital parts of a vessel of war than any other system hitherto employed.

A further notable advantage has been developed by the above tests, the importance of which to the United States at this juncture will be easily appreciated. It has been definitely established that armor of excellent quality may be produced by the rolling process, and that

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forging by means of the hammer is not absolutely necessary, a matter regarding which grave doubts have existed among artillerists for years.

It may be considered as probable that within 18 months, with relatively slight expenditure of money, the present armor producing capacity of the United States could be quadrupled in case such expansion should become necessary. It is also anticipated that the price at present paid should be materially reduced for the same reasons of active competition and lack of necessity of extraordinary changes in or additions to plant.

The report of the Board on Armor Trials is appended.

RANGE FINDERS.

During the year a range finder entirely novel in character and of simple construction, invented and constructed by Prof. A. A. Michelson, of Worcester, Mass., was tried at the Naval Ordnance Proving Ground, Annapolis, Md., with results sufficiently promising to cause the Bureau to propose to the inventor the construction of another instrument by a competent maker, embodying such improvements as were suggested by the tests, the Bureau paying the actual cost of the manufacture. This range finder will be given a thorough trial when completed, and it is hoped will prove of great value.

The Fiske range finders on the *Chicago* and *Baltimore* have received further trials during the year. The former, being the first of its kind constructed, has many faults and deficiencies which have been pointed out in the reports made upon it. The latter is of later design and much more efficient. The report of a board of officers upon this range finder after some months experience with it on the *Baltimore*, while recommending certain further changes and improvements, is quite favorable, and speaks highly of its advantages as an aid to navigation as well as for use in battle.

The field of usefulness of the Fiske range finder is greatly limited by the fact that it is efficient only over about 90° on each side of the vessel on which it is placed, thus leaving a large arc on which the range can not be measured; and while this can be remedied by the use of another range finder, using the beam of the ship as a base line, even then the accuracy of measurement over this arc is greatly reduced. This fact, their considerable cost, and the hope of finding simpler means to the end, have prevented the Bureau from issuing more of these range finders to the service.

THE WORKING OF GUNS AND CARRIAGES BY PNEUMATIC PRESSURE.

The second trial of the 8-inch gun carriage submitted to the Department by the Pneumatic Gun Carriage and Power Company, took place in November last at the Naval Ordnance Proving Ground at Annapolis, Md. The board of officers appointed to report upon the trial, although recognizing the many disadvantages of the system for use on board ship, recommended the acceptance of this carriage, as technically meeting the terms of the act of Congress appropriating for its purchase. Since that time it has been used occasionally with low charges in the test of projectiles, and has given much trouble as shown by the following extract from the report of the inspector of ordnance in charge of work at Annapolis.

Besides the theoretical disadvantages given by the two boards, it requires the attention of a skilled mechanic to keep it in working order. Unlike the service carriage, which is ready for use at all times, it requires sufficient time to get up steam to

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maintain the pressure in the recoil cylinders before it can be used, even when worked by hand. If the engine or air pump prove to be out of order, or accidents happen to them, as twice occurred, the carriage is useless for the time being. It is difficult to keep the joints and packing air-tight, and to maintain the pressure in the recoil cylinders for any length of time. When the training engines can be made to work, they can not be used for fine training and their use has been discarded altogether, using only hand gear.

The Bureau is thus confirmed in its opinion of this type of gun-carriage as stated in its last report.

The construction by the company above-mentioned of the pneumatic machinery and apparatus for controlling the 10-inch gun of the *Terror* has continued at the South Boston Iron Works, under the inspection of Capt. E. O. Matthews, U. S. Navy, and their material is being installed in the *Terror*, at the Brooklyn navy-yard as it is completed.

NAVAL MAGAZINES.

As mentioned in the last report, a suitable site for the naval magazine, to replace the one abandoned on Ellis Island, was found near Dover, N. J., in the reservation controlled by the Ordnance Department of the Army. This site, consisting of about 300 acres in all, has been acquired, and was formally transferred to a representative of the Navy Department on June 9, 1891, and the work of clearing the ground preparatory to the erection of the necessary buildings was at once begun. A magazine, shell house, and three small cottages are being erected, the last for the use of the gunner in charge and two watchmen, and these buildings are now nearing completion. It is proposed to make this the principal storehouse for naval uses, for powder and high explosives on the Atlantic coast.

This important work is under the charge of Commander J. B. Coghlan, inspector of ordnance, navy-yard, League Island, Pa., of whose zeal and attention in its prosecution the Bureau can not speak too highly.

An appropriation of $15,000 having been made for dredging a channel to Craney Island magazine and for repairs to the wharves and buildings, the Bureau advertised for bids and in July last contracted with Mr. Joseph Baker, the lowest bidder for doing the work for $14,558.08 in all. This work is progressing favorably under the inspection of the inspector of ordnance at the Norfolk navy-yard.

The Treasury Department having requested the removal of powder, etc., from the old magazine at Sitka, Alaska, the Bureau obtained an appropriation of $10,000 for this purpose, and in June last advertised for bids for a new magazine and shell house to be located on Japonski Island, a naval reservation at Sitka. In July a contract was made with Messrs. C. W. Young and E. J. Ellenger, of Juneau, Alaska, the lowest bidders, for the erection of a magazine and shell house and building a wharf and approaches to them for $7,514 in all. This work is now being done under the inspection of the commanding officer of the U. S. S. *Pinta*.

Besides the above some small repairs have been made in naval magazines out of the current appropriation.

NAVAL TORPEDO STATION.

The Naval Torpedo Station, Newport, R. I., has remained under the charge of Commander T. F. Jewell, U. S. Navy, during the past year.

The plant for the manufacture of gun cotton as well as that for the

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development and construction of torpedoes, and, within experimental limits, of smokeless powder, has been about doubled in capacity since the last report. The station is now well equipped and capable of meeting any demands which are likely to be made upon it.

This station has produced most excellent results in various directions during the year, the most notable being that of smokeless powder of a character and type as already mentioned elsewhere, which leads the Bureau to believe that the conditions for this feature of the naval outfit are satisfactorily obtained.

Many important chemical analyses have been made of the various kinds of armor plates, mineral deposits containing nickel ores, and foreign, domestic, and smokeless powders, from which much valuable information has been obtained.

Experiments and tests have been conducted with the Patrick torpedo, and the necessary torpedo equipments of the various wooden vessels fitting out for sea during the past year have been supplied from Newport.

The attention of the Department is respectfully directed to the admirable report of Commander Jewell upon the work with which he is charged, in particular the notes upon the development of smokeless powder.

The results obtained at the Naval Torpedo Station in various directions during the past year, and the marked increase in the efficiency of the plant, are worthy of much commendation.

INSTRUCTION OF ENLISTED MEN.

The instruction of enlisted men in ordnance work and practical electricity has continued during the year at the Naval Torpedo Station and at the Washington Gun Factory.

At the Naval Torpedo Station, the average number under instruction was 21; 32 seamen qualified as seamen gunners; and 4 were transferred to the general service, 3 on account of unsatisfactory conduct and 1 for inaptitude.

At the Washington Gun Factory 87 men were under instruction during the year. Of these 55 qualified as seamen gunners, 1 failed, 7 were detached on account of bad records, and 1 was discharged at his own request.

The character of the men under instruction at both stations has generally been excellent, and most of those who qualified did so with great credit, showing evidence of careful attention to work and of a mechanical and professional knowledge that will make them most useful in the service.

It is the intention of the Bureau to employ at the Indian Head Proving Ground a part of the men under instruction at the Washington Gun Factory, thus giving them a valuable experience with modern ordnance work and at the same time derive benefit from their services.

In the same manner the seamen gunners under instruction at the Naval Torpedo Station will be detailed for service on the torpedo boats *Cushing* and *Stiletto* during the trials of automobile torpedoes and at other times, in order to give them a practical knowledge of the working of these new weapons soon to be employed in the service.

The report of the inspector of ordnance at the Washington Gun Factory, Commander Charles O'Neil, on the course of instruction, will be found appended.

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MISCELLANEOUS.

A preliminary agreement was made with the Hurst Reënforce C a tridge and Arms Company, as stated in the last report, but the company has taken no further steps in the matter of concluding the contract with the Department.

The Bureau has purchased a Grenfell night sight and has placed it on board the *Petrel* for test. Two Canet night sights have also been ordered and will be tested when received.

A system of communicating ranges and other information from a central station on board ship to the gun stations by electricity has been developed, by the Bureau's directions, at the Naval Torpedo Station, and has been installed for experimental test on the *Yorktown*. A preliminary report upon these range indicators states that they work well and are of great value, and after further trial the Bureau contemplates applying the system to other vessels.

Appropriations were made by the last Congress of $8,000 for a steel shell lighter and $30,000 for a floating or tug crane, both for use at New York in conveying powder and shell from the new magazine at Dover, N. J., and in putting guns and ordnance stores on vessels lying in the stream. The Bureau advertised for bids for the steel shell lighter in December last and contracted with the lowest bidder, Charles Reeder & Sons, of Baltimore, Md., to supply it, built in accordance with the Bureau's plans and specifications, for $7,300. This lighter has been completed, accepted, and is in use by the Bureau.

In September, 1891, the Bureau advertised for the floating or tug crane, and in October contracted with the lowest bidder, Mr. Dennis McCarthy, of Brooklyn, N. Y., to furnish it for $26,400.

Experiments have been made on a small scale with a steel netting made by the Midgely Wire Belt Company, of Beaver Falls, Pa., for the purpose of determining its efficiency as a means of protection for guns' crews against fragments of bursting shells, etc. Further tests are to be made and it is thought that heavy wire mats hung between the guns will prove preferable to thin steel plating for this purpose of shelter.

The question of the transportation of heavy guns overland has received the attention of the Bureau, and negotiations entered into with the Pennsylvania Railroad Company have resulted in the agreement of that company to make a flat car capable of carrying the 13-inch 60-ton guns of the battle-ships. The Department will thus be enabled to transport the guns of the *Oregon*, building at the Union Iron Works, San Francisco, Cal., to the Pacific coast.

In this connection the Bureau desires to strongly urge the advisability of establishing upon the Pacific coast a national gun factory similar in character to that in Washington. The importance of such an establishment in case of war can not be overestimated.

Should such a gun factory be erected, it will probably be desirable to place it under the joint supervision of the Ordnance Department of the Army and the Bureau of Ordnance of the Navy Department, as its products would be necessary to both arms of the service.

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OFFICERS PERFORMING ORDNANCE DUTY.

The following are the officers of the Navy employed under this Bureau, with their respective stations and duties:

Name and station.	Duties.
Commander George A. Converse	President of the Board charged with the subject of torpedoes and torpedo boats, etc.
Lieut. Commander A. R. Couden	Armor and gun steel.
Lieut. Charles A. Bradbury	Member of Board on torpedoes and torpedo boats.
Lieut. Alex. McCrackin	Turret mounts.
Lieut. F. F. Fletcher	Mounts for secondary battery guns.
Lieut. C. J. Bonsh	Mounts for 6-inch guns, magazines, and storage of ammunition.
Lieut. A. E. Culver	Ships' invoices and estimates.
Ensign I. K. Seymour	Powder, and shrinkages of gun forgings.
Ensign T. C. Fenton	Turret mounts.
Prof. P. R. Alger	Marine artillery construction, powder, armor, and gun steel.
WASHINGTON NAVY-YARD.	
Commander Charles O'Neil	Inspector of ordnance.
Lieut. Commander E. C. Pendleton	General charge of the arrangement and distribution of work in the gun shop and gunner's gang; installation of machinery.
Lieut. Commander J. M. Miller	Charge of the manufacture of projectiles.
Lieut. C. O. Allibone	Charge of the manufacture of 5-inch guns, their mounts, shields, and accessories; gun locks, fuses, cartridge bags; treatment of armor plates, and certain experimental work; of work for the naval proving ground.
Lieut. F. H. Crosby	Charge of the manufacture of 6-inch and 8-inch gun carriages, their circles, shields, and accessories, and photography.
Lieut. Downs L. Wilson	Charge of the manufacture of powder tanks and primers; also of miscellaneous work and the inspection of materials.
Lieut. C. J. Badger	Charge of the manufacture of 4-inch guns, their mounts, shields, and accessories; of all mounts for guns of secondary battery; drill cartridges, practice barrels, and miscellaneous work.
Lieut. R. F. Nicholson	Charge of the manufacture of turret mounts and their appurtenances.
Lieut. Alfred Reynolds	Charge of the manufacture of 6-inch guns.
Lieut. T. S. Rogers	Charge of the manufacture of 8-inch, 10-inch, 12-inch, and 13-inch guns.
NAVY-YARD, NORFOLK, VA.	
Lieut. Commander W. T. Burwell	Inspector of ordnance.
NAVY-YARD, LEAGUE ISLAND, PA.	
Commander J. B. Coghlan	Inspector of ordnance; also in charge of the erection of buildings at the new naval magazine, Dover, N. J.
NAVY-YARD, NEW YORK.	
Commander A. H. McCormick	Inspector of ordnance.
Commander A. S. Crowninshield	Assistant inspector of ordnance.
Lieut. Geo. A. Calhoun	Do.
NAVY-YARD, BOSTON.	
Commander Francis A. Cook	Inspector of ordnance.
Lieut. Commander Wm. A. Morgan	Charge nitre depot, Malden, Mass.
NAVY-YARD, PORTSMOUTH, N. H.	
Commander N. Mayo Dyer	Inspector of ordnance.
PENSACOLA NAVY-YARD.	
Lieut. John B. Collins	Inspector of ordnance.
NAVY-YARD, MARE ISLAND, CAL.	
Commander Charles E. Clark	Inspector of ordnance.
TORPEDO STATION.	
Commander Theo. F. Jewell	Inspector of ordnance, in charge of station.
Lieut. Commander H. W. Lyon	Assistant.
Lieut. T. C. McLean	Assistant; member of Board on torpedoes and torpedo boats; also inspects work on Whitehead torpedo at the works of E. W. Bliss Co., Brooklyn, N. Y.
Lieut. Martin E. Hall	Assistant.
Lieut. Wm. A. Marshall	Do.

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Name and station.	Duties.
NAVAL ORDNANCE PROVING GROUND, ANNAPOLIS, MD.	
Lieut. Commander J. H. Dayton	Inspector of ordnance, in charge of station.
Lieut. Francis E. Greene	Assistant.
NAVAL PROVING GROUND, INDIAN HEAD, MD.	
Ensign R. B. Dashiell	Inspector of ordnance, in charge of station.
Ensign A. C. Dieffenbach	Assistant.
Ensign Armistead Rust	Assistant.
PRIVATE WORKS.	
Lieut. W. C. Cowles	Inspector of ordnance, in charge of the manufacture of armor at the works of Carnegie, Phipps & Co., Pittsburg and Munhall, Pa.
Lieut. Wm. A. Gill	Assistant to above.
Lieut. Kossuth Niles	Inspector of ordnance, in charge of the manufacture of armor and gun steel at the works of the Bethlehem Iron Co., South Bethlehem, Pa.; also of armor-piercing shell at the works of the Carpenter Steel Co., Reading, Pa.
Ensign Fred. R. Brainard	Assistant to above.
Lieut. F. J. Drake	Member of board of torpedoes and torpedo boats; also inspector of ordnance in charge of the manufacture of the Howell torpedoes at the works of the Hotchkiss Ordnance Co., Providence, R. I.
Ensign Miles C. Gorgas	Inspector of ordnance, in charge of the manufacture of gun steel and gun carriage castings at the works of the Midvale Steel Co., Nicetown, Philadelphia, Pa., and of gun-carriage castings at the works of the Standard Steel Casting Co., Thurlow, Pa.
Ensign H. H. Eames	Inspector of ordnance, in charge of the manufacture of rapid-fire and machine guns and their ammunition, and of small arms and their ammunition, at the works of Pratt & Whitney, Pratt & Cady, Colt's Fire Arms Co., Hartford, Conn.; Winchester Repeating Arms Co., New Haven, Conn.; Union Metallic Cartridge Co., Bridgeport, Conn., American Projectile Co., Lynn, Mass.; and Simonds Rolling Machine Co., Fitchburg, Mass.

The following statements are appended, viz:

A.—Statement showing the amount appropriated under each specific head of appropriation for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1891, expenditures during the same period, and balance remaining on hand June 30, 1891.

B.—Statement of the number of days' labor and cost thereof, from July 1, 1890, to June 30, 1891, at the respective navy-yards and stations, chargeable to the Bureau of Ordnance.

C.—Amounts expended during the fiscal year ending June 30, 1891, from the appropriations under the Bureau of Ordnance for civilians employed on clerical duty, or in any other capacity than as ordinary mechanics and workingmen.

D.—Abstract of offers for furnishing supplies or services and which were contracted for by the Bureau of Ordnance during the fiscal year ending June 30, 1891, and contracts awarded thereon.

I am sir, your obedient servant,

WM. M. FOLGER,
Chief of Bureau.

The SECRETARY OF THE NAVY.

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A.—*Statement showing the amount appropriated, under each specific head of appropriation, for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1891, expenditures during the same period, and balance remaining on hand June 30, 1891.*

Appropriation.	Appropriated.	Expended.	Balance June 30, 1891.
Ordnance	$144,000.00	$117,184.88	$26,815.12
Repairs	15,000.00	11,893.06	3,106.94
Civil establishment	26,624.00	25,370.10	1,253.90
Contingent	8,000.00	5,994.33	2,005.67
Torpedo station	60,000.00	42,447.24	17,552.76
Total	253,624.00	202,889.61	50,734.39

The amounts expended were—

For labor $142,380.12
For material, etc 60,509.49

The balances remaining are all needed to meet outstanding obligations, except under "Civil establishment."

The above statement does not embrace continuous appropriations for the new ships, or for special objects.

B.—*Statement of the number of days' labor and cost thereof, from July 1, 1890, to June 30, 1891, at the respective navy-yards and stations, chargeable to the Bureau of Ordnance.*

Navy-yards.	Number of days.	Cost.
Portsmouth	1,289	$3,107.00
Boston	955	2,252.27
New York	20,183	54,189.61
League Island	1,890	4,139.40
Washington	301,015	714,123.88
Norfolk	3,864	8,077.27
Pensacola	313	480.00
Mare Island	9,579	25,527.37
Key West, Fla	31	75.00
Naval ordnance proving ground	15,900	18,792.08
Torpedo station	13,836	36,422.70
Total	368,855	867,186.58

Includes labor on outfits for the new ships and under appropriations for special objects.

C.—*Amounts expended during the fiscal year ending June 30, 1891, from the appropriations under the Bureau of Ordnance, for civilians employed on clerical duty, or in any other capacity than as ordinary mechanics and workingmen.*

Navy-yard.	Rating.	Amount paid.
Portsmouth	1 writer (6 months)	$500.00
Boston	1 writer (6 months)	500.00
New York	1 clerk	1,400.00
	1 assistant expert in steel (Bethlehem iron works)	1,366.00
Washington	1 clerk	1,600.00
	1 clerk	785.76
	1 writer	1,017.25
	1 writer	1,017.25
	1 telegraph operator and copyist	900.00
	1 copyist	682.53
	1 copyist	712.11
	1 draftsman	1,600.00
	1 draftsman	1,033.61
	1 draftsman	1,081.00
	1 draftsman	1,081.00
	1 draftsman	1,230.00
	1 draftsman	834.75
	1 draftsman	1,089.50
	1 draftsman	1,313.50

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C.—*Amounts expended during the fiscal year ending June 30, 1891, from the appropriations under the Bureau of Ordnance, etc.*—Continued.

Navy-yard.	Rating.	Amount paid.
Washington	1 draftsman	$1,640.45
	1 draftsman	939.00
	1 draftsman (20 days)	50.00
	1 draftsman	867.50
	1 draftsman (28 days)	84.00
	1 draftsman	830.37
	1 draftsman	696.50
	1 writer	1,252.00
	1 writer	1,112.59
	1 writer	954.34
	1 writer	835.36
	1 writer	1,114.27
	1 writer	1,012.00
	1 writer	383.60
	1 writer	209.99
	1 stenographer and typewriter	566.12
	1 copyist	1,020.38
	1 chemist	2,387.85
	1 electrician (211 days)	675.20
	1 foreman	1,500.00
	1 foreman	1,500.00
Norfolk	1 clerk	1,200.00
Mare Island	1 writer	1,017.25
Naval ordnance proving ground	1 writer	1,017.25
Torpedo station	1 chemist	2,500.00
	1 clerk	1,200.00
	1 draftsman	1,500.00
		47,164.48

D.—*Abstract of offers for furnishing supplies or services, and which were contracted for by the Bureau of Ordnance during the fiscal year ending June 30, 1891, and contracts awarded thereon:*

Six frame houses, naval proving ground, Indian Head. (Advertisement dated August 11, 1890.)

Daniel Harding	(Informal.)	$8,200
John H. Bird		10,000
Martin Hendricks	(Informal.)	8,850
James B. Haliday and Samuel S. Richardson		*6,900
Charler Medford		15,000
Plager & Acorn		10,160
William Rothweil		10,500
George H. Morrow		11,923

A steel-shell lighter. (Advertisement dated November 12, 1890.)

Charles Reeder & Sons	$7,950

Reduced to $7,300 and accepted December 15, 1890. Contract dated December 30, 1890.

A steam launch. (Advertisement dated August 21, 1890.)

J. Beaver Webb	$10,000
Pusey & Jones Co	15,000
C. Reeder & Sons	13,500
Ellis R. Meeker	18,900

Repairs to wharf, Bellevue magazine, District of Columbia. (Advertisement dated May 4, 1891.)

George T. Cumberland	‡$1,149
Joseph L. Breen	1,450

*Accepted August 27, 1890. Contract dated September 9, 1890.
†Accepted. Contract dated February 26, 1891.
‡Accepted. Contract dated June 6, 1891.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Ordnance, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES.			
Chief clerk (act March 3, 1891. R. S., p. 70, sec. 416)	$1,800.00		
Draftsman (same acts)	1,800.00		
One assistant draftsman (acts July 11, 1888, March 3, 1891; vol. 25, p. 283, sec. 1)	1,400.00		
One clerk of class 3 (act March 3, 1891; R. S., p. 27, sec. 167)	1,600.00		
One clerk of class 2 (same acts)	1,400.00		
One clerk of class 2 (submitted)	1,400.00		
One clerk of class 1 (act March 3, 1891; R. S., p. 27, sec. 167)	1,200.00		
One clerk (same acts)	1,000.00		
One copyist (same acts)	900.00		
One assistant messenger (same acts)	720.00		
One laborer (same acts)	660.00		
		$13,880.00	$12,480.00
NOTE.—To properly dispose of the increased volume of work passing through the Bureau, and keep accurate records such as the interests of the service demand, an increase of the clerical force is urgently needed, and one additional second-class clerk is asked for.			
ORDNANCE AND ORDNANCE STORES.			
Procuring, producing, preserving, and handling ordnance material; for the armament of ships; for fuel, tools, and material, and labor to be used in the general work of the Ordnance Department; for furniture at magazines, at the ordnance dock, New York, and at the naval ordnance proving ground (appropriated; act March 2, 1891)	130,000.00		
Expenses of target practice (appropriated; act March 2, 1891)	15,000.00		
Maintenance of new proving ground (submitted)	25,000.00		
Boiler and engine for new proving ground (submitted)	15,000.00		
Construction of a telegraph line from the navy-yard, Washington, to the naval ordnance proving ground at Indian Head, Md., and instruments for same (submitted). NOTE.—There is no telegraph near, and the only mail communication with Indian Head is by boat; and as experiments in progress frequently render prompt reports and orders necessary, this appropriation is urgently recommended.	5,000.00		
Proof of naval armaments (appropriated; act March 2, 1891)	15,000.00	205,000.00	155,000.00
REPAIRS, ORDNANCE.			
Necessary repairs to ordnance buildings, magazines, gun parks, boats, lighters, wharves, machinery, and other objects of the like character (appropriated; act March 2, 1891)		30,000.00	30,000.00
CONTINGENT, ORDNANCE.			
Miscellaneous items, viz: Freight to foreign and home stations; advertising; cartage and express charges; repairs to fire engines; gas and water pipes; gas and water tax at magazines; tolls, ferriage, foreign postage, and telegrams to and from the Bureau, and incidental expenses attending inspection of ordnance material (appropriated; act March 2, 1891)		10,000.00	8,000.00
TORPEDO OUTFITS.			
For torpedo outfits for the *Atlanta*, *Boston*, and *Chicago* (submitted)		82,000.00	
ARMING AND EQUIPPING NAVAL MILITIA.			
For arms and equipments connected therewith for naval militia of various States under such regulations as the Secretary of the Navy may prescribe (appropriated; act March 2, 1891)		25,000.00	25,000.00
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.: One writer (appropriated; act March 2, 1891)	500.00		
Navy-yard, Boston, Mass.: One writer (appropriated; act March 2, 1891)	500.00		

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Ordnance, Navy Department—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
CIVIL ESTABLISHMENT—continued.			
Navy-yard, New York:			
One clerk (appropriated; act March 2, 1891)	$1,400.00		
One writer (submitted)	1,017.25		
Navy-yard, Washington:			
One clerk (appropriated; act March 2, 1891)	1,600.00		
One clerk (appropriated; act March 2, 1891)	1,200.00		
One clerk (submitted)	1,200.00		
One chemist (submitted)	2,500.00		
Two writers, at $1,017.25 each (appropriated; act March 2, 1891)	2,034.50		
One draughtsman (appropriated; act March 2, 1891)	1,800.00		
Three draughtsmen, at $1,081 each (appropriated; act March 2, 1891)	3,243.00		
One assistant draughtsman (appropriated; act March 2, 1891)	772.00		
Two foremen; one at $2,000, and one at $1,500 (appropriated; act March 2, 1891)	3,500.00		
Two copyists, at $720 each (appropriated; act March 2, 1891)	1,440.00		
One telegraph operator and copyist (appropriated; act March 2, 1891)	900.00		
Navy-yard, Norfolk, Va.:			
One clerk (appropriated; act March 2, 1891)	1,200.00		
Navy-yard, Mare Island, Cal.:			
One writer (appropriated; act March 2, 1891)	1,017.25		
Naval Ordnance Proving Ground:			
One writer (appropriated; act March 2, 1891)	1,017.25		
Torpedo station, Newport, R. I.:			
One chemist (appropriated; act March 2, 1891)	2,500.00		
One clerk (appropriated; act March 2, 1891)	1,200.00		
One draughtsman (appropriated; act March 2, 1891)	1,500.00		
		$32,041.25	$26,824.00
NOTE.—The above estimate adds one chemist at $2,500 for the Washington navy-yard, and one clerk at $1,200 to the office force. An additional writer is also asked for at the New York navy-yard. These increases are recommended by the station named and approved by the Bureau. An increase of $500 in the pay of one of the foremen at the Washington navy-yard is also asked for and recommended.			
TORPEDO STATIONS.			
For labor, material, freight and express charges; general care of and repairs to grounds, buildings, and wharves; boats, instruction, instruments, tools, furniture, experiments, and general torpedo outfits (appropriated; act March 2, 1891		60,000.00	60,000.00
NEW MACHINERY, WASHINGTON NAVY-YARD.			
Purchase and installation of new machinery for the breech mechanism shop at the navy-yard, Washington (submitted)		100,000.00	
PURCHASE OF STEEL PLATES.			
For purchase of steel plates for reception tests of modern armor-piercing projectiles (submitted)		50,000.00	
INCREASE OF THE NAVY ARMOR AND ARMAMENT.			
Towards the armament and armor, of domestic manufacture, for the vessels authorized by the act of August 3, 1886; of the vessels authorized by section 3 of the act approved March 3, 1887; of the vessels authorized by the act approved Sept. 7, 1888; of the vessels authorized by the act approved March 2, 1889; of those authorized by the act of June 30, 1890, and of the one authorized by the act of March 2, 1891 (appropriated; act March 2, 1891)		4,186,250.00	4,000,000.00

Respectfully submitted.

WM. M. FOLGER,
Chief of Bureau.

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REPORT OF LIEUT. F. F. FLETCHER—INSPECTION OF EUROPEAN MANUFACTORIES OF ORDNANCE MATERIAL, ETC.

NAVY DEPARTMENT,
Washington, June 25, 1891.

Sir: In obedience to orders of the Navy Department and under the instruction of the Bureau of Ordnance I have the honor to report that I have completed a tour of inspection of the principal European manufactories of ordnance material and a number of foreign ships of war for the purpose of noting the more recent developments in matters pertaining to naval ordnance, with special reference to questions affecting the installation of the armament on board the new naval vessels now building in this country.

Through the courtesy everywhere extended me I was enabled to visit the naval stations at Naples and Spezzia, in Italy; Toulon in France; and Portsmouth, Chatham, and Woolwich in England; the manufactories at Pozzuoli, Terni, St. Chamond, Le Creusot, St. Denis, Havre, Sheffield, Manchester, and Elswick; and the following vessels, viz: *Italia, Umberto, Caimen, Marceau, Acheron, Mitraille, Thunderer, Nile, Sans Pareil, Hood, Blake and Psara.*

The high power of modern naval guns has rendered the question of mounting them so as to efficiently control their recoil and the various operations connected with loading and firing them one of the most difficult problems of naval ordnance. My observations upon this subject were more specially confined to the carriages for guns of large caliber mounted in barbettes or turrets forming a heavy armored protection. The advantages and disadvantages of the various methods employed were noted, and it was ascertained as far as practicable with what success they have been attended under service conditions.

The gun carriages that I have been enabled to examine represent about all the different designs in use as well as the various combinations and modifications of the ideas and principles employed in each, and so great is the variety that on no two ships in the list given above are the guns mounted alike.

The result of my observations upon this subject and the requirements of mountings for heavy guns may be more readily comprehended by confining this section of report to pointing out the merits and defects of the means employed abroad by which the following results must be accomplished.

(1) Checking the recoil and returning to the firing position.
(2) Elevating and depressing.
(3) Training.
(4) Loading and handling ammunition.

1. CHECKING THE RECOIL.

The mechanical devices in common use all depend upon the same principle, that of giving a high velocity to the liquid as it passes through a variable opening from the pressure to the nonpressure side of the piston in a hydraulic cyclinder. None of the devices employed abroad for this purpose seem to equal in mechanical simplicity the system of hydraulic recoil brake already adopted by the Bureau of Ordnance, nor does it appear that they are always as efficient in their action.

The return of the gun to the firing position is effected by means of

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the power stored in springs, by gravity where the gun is on an inclined slide or by hydraulic pressure in the recoil cylinders.

Of these three methods spring power is successfully employed for rapid-fire guns of as high as 6-inch caliber recoiling in the line of fire, and of 9.2″ caliber recoiling on horizontal slide. It can no doubt be applied to guns of larger caliber, though the mechanical fittings and the weight and space occupied may be found cumbersome.

The "gravity return" has been applied to guns of large caliber on board ship. It easily admits of the application of hand power for elevating and depressing and avoids the disadvantages of springs or hydraulic power, but the gun can not recoil in line of fire and is more difficult to protect.

With hydraulic power, pressure in the recoil cylinder returns the gun to the firing position. The devices heretofore used for that purpose have proved difficult of adjustment and not always satisfactory in service, but more recent designs of Mr. Vavasseur and Mr. Canet have been found to work well. In these designs, differing greatly in their mechanical arrangements, and all other designs at present employed abroad it is to be noted that the utility of the hydraulic brake depends upon the liquid introduced in the cylinder under pressure after each recoil. If this supply of liquid should fail, through any accident to the source of power below, any injury to the system of hydraulic piping, or any derangement or clogging of the valves, the gun will be practically disabled through failure of the recoil brake. This can not be regarded otherwise than as a serious defect.

The objection to this arrangement is fully overcome in the recent hydraulic mountings of the Bureau of Ordnance by the use of an independent cylinder for running the gun in and out to battery. By this means the hydraulic brake cannot be disabled through any of the causes mentioned above, but the gun itself is still dependent for part of its efficiency upon the hydraulic machinery. An independent source of power used in this direction would be an evident advantage.

The use of pneumatic power for controlling the recoil of guns and maneuvering them in action has not been attempted abroad, being regarded as unsuited for this purpose. In certain types of disappearing carriages for land fortifications and coast defense a small reservoir of air under pressure is employed for raising the gun to the firing position after the recoil. This system was successfully applied to a 6-inch naval carriage built some years ago by the Bureau of Ordnance. Since that date it has met with favor abroad, particularly in Italy, where it is now used for raising guns of 67 tons weight, requiring more power than is needed for this purpose with the heaviest guns afloat. The space occupied is comparatively small, and the reservoir being once charged the power is retained for a considerable length of time without decreasing. It is reliable in its action, requires but little attention, and is not subject to serious derangement. Designs are being prepared abroad in which this device will be applied to guns mounted on board ship, and it bids fair to prove a simple and efficient method of automatically returning the gun to battery, thus avoiding the more complicated hydraulic arrangements in use at present.

2. ELEVATING AND DEPRESSING.

The mechanical appliances for effecting these operations are determined by the manner in which the gun is mounted, whether with trunnions pivoted in the line of fire or with a slide pivoted beneath the port

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opening. The use of trunnions requires the pivot to be placed further inside the armored turret, thus causing a comparatively large port opening and slightly greater exposure of the gun carriage and crew. Also the center of gravity of the gun being placed near the center of the turret a larger turret is required to obtain the same space in rear of the breech. These objections are overcome by placing the pivot beneath the line of fire, close to the turret wall. The port opening, the size and weight of the turret, are thus reduced to a minmum. Owing to the position of this pivot, beneath the line of fire and around which the gun tends to revolve, the elevating gear must be sufficiently strong to withstand the full shock of recoil. This is accomplished by the use of a heavy hydraulic ram secured to the floor of the turret. Here, again, the objection arises that any accident to the source of power below, any injury to the system of hydraulic piping or any derangement or clogging of the valves will practically disable the gun.

On the other hand the use of trunnions avoids any undue strain upon the elevating gear, and it may even be completely destroyed without necessarily destroying the efficiency of the gun. It has been found that when a knife edge is placed in the trunnion seats the friction is almost eliminated, and the gun can be elevated and depressed with the greatest facility by the captain of the gun himself, using only a small hand wheel. All of the 10-inch guns on the new English battle ships and the 67-ton guns on the Italian ships *Umberto*, *Sardegna*, etc., will be fitted with this device for hand power, thus doing away with the hydraulic ram. The objection to the larger port opening necessitated by the use of trunnions applies more particularly to the vertical turret. But with guns in a barbette mounted with trunnions and recoiling in the line of fire the top shield may be so disposed as to materially reduce the size of the opening. The greater dependence that can be placed upon a gun mounted with trunnions pivoted in the line of fire would appear to be of more importance than the slight advantage gained in weight and protection by the use of the ram with its hydraulic machinery.

3. TRAINING.

Hydraulic power is used in all the English and Italian ships and the two oscillating engines are on opposite sides of the turret walls. In ships built in France two heavy hydraulic rams are used beneath the protective deck, working a sprocket chain around the ammunition tube which is rigidly connected to the turntables.

In many of the new English ships, in some ships building in France, and in all German ships, steam power will be used for this purpose in preference to hydraulic power. Recent designs in France contemplate the use of electric power. In the application of steam or electric power, it seems necessary to employ worm gearing to insure steadiness in a seaway. This is attended by considerable loss of power. Hydraulic power, on the other hand, gives a steady motion, easily regulated, and the turret is locked by closing the valve which regulates its motion.

None of the above methods seem to possess any special advantages. It may be noted, however, that when the engine for turning the turret is placed beneath the protective deck it apparently makes but little difference, except as to economy, whether steam, hydraulic, or electric power is used. In either case, two sets of connections with the turret are required; one to rigidly transmit the power, and the other by geared rods, hydraulic pipes, or electric wire to control the engine below. When the engines are placed within the barbette or turret, the power

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is conveyed to it either by steam pipe, hydraulic pipe, or electric wire, and but one connection is required with the lower deck. The apparent advantage of electric power lies in the simple connection required to convey it to the gun and the facility with which the wire may be replaced if injured.

When the training gear is disabled, the gun may be still efficiently trained upon the target by the ship itself. This may, however, seriously affect her maneuvering power. The value of recourse to hand power, even though very slow in motion, is therefore, recognized, and provision is being made for its application on new vessels now building. It will be found that by slightly heeling the ship very heavy turrets may be turned by hand.

4. LOADING AND HANDLING AMMUNITION.

There are two systems now commonly used for turreted guns. First, loading in a fixed position of train to which the guns are turned so as to bring the breech over the stationary ammunition tube at the side of the turret; second, loading in all positions of train by means of a central tube revolving with the gun and conveying the charge direct to the breech. Loading in a fixed position of train has been invariably practiced in England, and its advocates claim that the mechanical means employed are simpler and less liable to get out of order. It enables the center of gravity of the gun to be placed more nearly coincident with the center of rotation, thus requiring a smaller turret, less power for training, and greater steadiness in a seaway. In small ships the heel and consequently the elevation of the gun is not seriously altered by a sudden change in the direction of train. On the other hand, a greater weight of armor is required in order to protect the ammunition hoist. But the most serious disadvantage lies in the fact that after each fire the gun may be greatly exposed by training to the loading position.

With the central loading tube there is no special gain in rapidity of fire, but the muzzle of the gun may always be kept pointed toward the enemy, and less weight of armor is required for the same amount of protection.

The ammunition, consisting of the projectile and the powder in two sections, is hoisted direct to the breech of the gun by either a hydraulic tackle or a telescopic rammer. In more recent designs steam power is employed, fitted for the alternate use of hand power. The ammunition for 10-inch guns on the *Thunderer*, etc., is handled entirely by hand power, twenty-five to thirty projectiles being stored in the turret for immediate use.

The ammunition carriers used in England consist of three trays one above the other, thus requiring three hoists to place the projectile and each section of the power successively in rear of the breech. With the ammunition carrier used in France and made in the form of a drum but a single hoist is required, and the drum is then revolved by hand to bring each tray in the prolongation of the bore. There is no loss of time by this application of hand power.

The breech-blocks of the heaviest guns in England are manipulated entirely by hydraulic mechanism. In France hydraulic mechanism is generally supplemented by hand power. The heaviest guns on board some ships built in France fitted with the Canet breech mechanism can be opened and closed by hand in about twenty seconds, and mechanical power for this purpose is a convenience, but not a necessity.

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A telescopic hydraulic rammer is used for loading. Great difficulty has been experienced with fitting these rammers and making them work successfully. Hand power for loading is hereafter to be used for all 10-inch guns, and it has already been applied to 11-inch guns mounted on the *Psara* and class, built in France.

HYDRAULIC POWER.

The above general outline shows the mechanical means applied to working heavy guns as now practiced in Europe. The greatest development in any one direction has been made towards perfecting the application of hydraulic power. The result is best exemplified in the recent mountings of the *Nile* and *Trafalgar*, built in England, and the *Marceau Hoche* and *Pelayo*, in France. The *Nile* and *Trafalgar* represent the perfection of the English design of loading in one position. The installation of the hydraulic machinery is very complete and well worked out in all the minor details. Hydraulic engines, rammers, and bollards are numerous, and the arrangements and application of the power seem to be as simple as possible considering the character of the work and the number of operations to be performed. There is not a movement connected with the working of these guns, from handling the ammunition in the magazine to placing it in the gun and closing the breech, but that can be performed by the movement of a lever. This result has been attained only by years of experience, and after numerous defects have been remedied as suggested by extended practical trials at sea.

The mountings of the heavy guns as placed on board the ships built in France differ from the above in the general mechanical arrangements necessitated by the central ammunition tube. The power is somewhat more ingeniously applied than in the English type, and more mechanical devices are introduced to perform the various operations required. These two types of mountings appear equally efficient in their performance with mechanical simplicity in favor of the English method.

I was afforded an opportunity of witnessing an exercise drill with a heavy gun upon a recent type of hydraulic carriage. The various operations of training and running the gun in and out, elevating and depressing, opening and closing the breech plug, hoisting the ammunition, and loading with the telescopic rammer were all separately performed and afterwards successively as in actual firing trial. Everything worked smoothly and quickly, and but slight hitches occurred due to errors of the men in handling the various levers. It was an impressive exhibition and a beautiful example of perfection in the mechanical application of power.

Hydraulic mounting as now perfected in Europe, has reached a point beyond which there is little to be gained by further development. Regarding these mounts simply as machines to accomplish certain results their performance leaves nothing to be desired. On the other hand, regarding them as machines of war required to be equally as efficient under adverse conditions at sea and to withstand the severe test of actual war, the impression is strong that mechanical appliances have been carried to an injurious extreme. Even under favorable conditions in time of peace this complicated machinery requires constant care and attention. Pipes and valves become clogged in spite of precautions, joints work loose by the rolling of the ship, and the packings require frequent overhauling. Water freezes in the pipes, they are difficult to reach, and time is required to replace them when injured. In the operation of

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loading one of these guns, there is required from sixteen to nineteen separate movements of valves or levers. The effect of any injury in the long connecting link leading from the steam engines and hydraulic pumps below through the various connections to the gun itself has already been pointed out. The life of the gun, as it were, hangs by a thread which may be severed by a most trivial and unforeseen cause, and it is a question if the gun is not in as much danger of being disabled by the complicated character of its mounting as by the fire of the enemy.

HAND POWER.

The objections to the complicated character of the machinery necessitated by hydraulic mountings are apparently recognized to such an extent that efforts are being made to introduce simpler methods of working the guns. Hydraulic power is not being placed on board any of the German ships of war. The most recent tendency is toward the further development of hand power, and it has been successfully applied to an extent heretofore regarded as impracticable. We have seen that the breech plugs of the heaviest guns to be mounted afloat can be efficiently worked by hand power and the gun can be readily elevated and depressed by the captain of the piece himself. All operations connected with the working of 10-inch guns, except hoisting the ammunition and turning the turret by steam, will be performed by hand. The 11-inch guns as now mounted on the *Psara* and class can be worked entirely by hand. No doubt much larger guns than these can be worked by hand power alone, where engines below the protective deck or electric power in the turret is used for hoisting the ammunition and training.

From impressions gained by observations of different turret mountings as placed on board a number of ships, and noting the direction in which there is the greatest tendency to overcome the defects existing in the present system, it would appear that in the present state of the art a gun may be most advantageously mounted when governed by the following considerations:

(1) The hydraulic brake for checking the recoil should be independent of all other connections. Where hydraulic power is used for running the gun in and out a separate cylinder should be employed. The power in a cylinder charged with air under initial pressure beneath the gun may be found the most satisfactory way of returning the gun to the firing position.

(2) The gun should be mounted with trunnions pivoted in the line of fire to admit of elevating and depressing by hand and avoiding the use of the hydraulic ram and its machinery.

(3) With engines placed below the protective deck steam power can be made as efficient as any other for training the turret and hoisting the ammunition. With engines situated in the barbette or turret the electric wire is the simplest method of conveying the power.

(4) Breech plugs should be worked by hand power.

(5) There should be no operation connected with the working of any gun that can not, if necessary, be independently performed by hand power.

The new designs of the hydraulic mountings in this country, prepared under the direction of the Bureau of Ordnance, embody the best ideas heretofore employed abroad with desirable improvements in safety and simplicity. The perfection of the numerous mechanical details upon which the success of this type of carriage so largely depends is a result that can be obtained only by practical experience. This experience has

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already been obtained abroad. It is represented in the detail drawings of recent hydraulic carriages, the efficiency of which has been well tested by practical trials at sea. The possession of these drawings would be of value to the Bureau and save both time and expense in developing the work already begun.

As to future developments, however, importance should be attached to present tendencies abroad which seem to indicate that at no distant period hydraulic machinery for gun mountings will be supplanted by hand power with the limited use of steam or electricity.

I am, sir, your obedient servant,

F. F. FLETCHER,
Lieutenant U. S. Navy.

Commander WM. M. FOLGER, U. S. NAVY,
Chief of Bureau of Ordnance, Navy Department.

ANNUAL REPORT OF THE INSPECTOR OF ORDNANCE, NAVY-YARD, WASHINGTON.

ORDNANCE OFFICE, UNITED STATES NAVY-YARD,
Washington, D. C., October, 19, 1891.

SIR: I have the honor to submit for transmission to the Chief of Bureau of Ordnance the following report of the operations of this Department during the past year:

OFFICERS AND THEIR DUTIES.

Lieut. Commander E. C. Pendleton, the senior assistant, has general charge of the assignments and distribution of work in the gunshop, and is charged with the duty of seeing that a suitable number of machines is given to each class of guns, and that they are kept constantly supplied with work; has superintendence of all installations of new machinery and of machines being constructed at this yard and other additions to the plant; of boilers and engines, cranes, locomotive and cars, transmission of power, etc.; and also directs the employment of the laboring force outside of the shops, which is under the immediate charge of the gunner.

Lieut. Commander J. M. Miller (recently reported) has charge of the manufacture of all projectiles, both in the foundry and projectile shop.

Lieut. C. O. Allibone has charge of the manufacture of all 5-inch guns, mounts, shields, and accessories; all work for the naval proving ground; the manufacture of firing locks, fuses, cartridge-bags, and filling machines; treatment of armor plates by the "Harvey process," and certain miscellaneous and experimental work.

Lieut. F. H. Crosby has charge of the manufacture of 6 and 8 inch gun carriages, circles, shields, and accessories and of photography.

Lieut. D. L. Wilson has charge of the manufacture of all powder-tanks and primers, and has also miscellaneous work and inspection of materials.

Lieut. C. J. Badger has charge of the manufacture of all 4-inch guns, mounts, shields, and accessories, and all mounts for guns for secondary batteries, field and boat carriages, drill cartridges, practice barrels, and miscellaneous articles.

Lieut. R. F. Nicholson has charge of the manufacture of all turret

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mounts for 10, 12, and 13 inch guns, and of hydraulic motors and machinery connected therewith, and water motors for turning turrets.

Lieut. Alfred Reynolds has charge of the manufacture of 6-inch guns.

Lieut. T. S. Rodgers has charge of the manufacture of 8, 10, 12, and 13 inch guns.

Lieut. J. C. Chamberlin, U. S. Army, has been attached to the yard during the past year, and has had charge of the manufacture of guns, projectiles, and a great deal of miscellaneous work, including targets and armor for the proving ground, and has rendered valuable assistance and performed his duties in a manner highly creditable to himself and with profit to the establishment.

Lieut. J. R. Selfridge, U. S. Navy, and Lieut. J. T. Thompson, U. S. Army, have been detached during the year, but rendered efficient and valuable services while on duty.

Gunner J. J Walsh has charge of the laboring force outside of the shops, and of general ordnance work connected with the outfits of vessels; prepares all projectiles for issue, and also attends to the receipt and shipment of materials in connection with the general storekeeper's department.

Gunner C. H. Venable has charge of the naval magazine, and superintends the work of the class of seamen under instruction under the direction of Lieut. J. J. Knapp of the *Dale*.

Mr. Lionel Lenox is the chemist in charge of the laboratory.

All of the foregoing have performed their numerous and exacting duties with zeal, intelligence, and fidelity.

The following officers have been attached for short periods, "in attendance:" Commanders Henry Glass, E. T. Woodward, Geo. W. Pigman, and A. S. Barker.

CIVILIAN SUPERINTENDING FORCE.

The permanent civilian superintending force consists of two foremen, eight master mechanics, and four leading mechanics, appointed upon the recommendation of the "board for the examination of foremen and master mechanics;" and it is an interesting fact that they were all employed previously and were recommended for reappointment by the board.

WORKING FORCE.

The average number of men employed daily has been 935. Comparatively few changes have taken place among the mechanics who may, in general, be characterized as men of intelligence, good workmen, and of good habits, those falling short of these requirements having been weeded out from time to time as they became conspicuous.

It should certainly be regarded as a privilege to work in these shops, and it is undoubtedly so considered by a majority of the employés. To quote from the honorable Secretary of the Navy, "the poorest place is too good for an unworthy man." Much care has been taken to collect and preserve each man's record, and the operations of the board of labor employment and system of registration now in vogue are found to be not only satisfactory but to afford much relief to those who heretofore were charged with the selection of employés by putting an end to the almost endless importunities to which they were formerly subjected.

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BOYS.

The number of young men (61) learning trades is considered excessive; a smaller number would receive greater advantages and their services would be of more value to the Government. The number now authorized, *i. e.*, a number equal to 12 per cent of the skilled force, might advantageously be reduced to 6 per cent. Quarterly examinations are held by a board of officers to ascertain their proficiency and for the purpose of properly grading them, and they receive all the opportunities to improve themselves that can conveniently be given. As a rule the young men do well, but they are too numerous.

As a matter of interest the following statistics with regard to the force are given:

Of the total number of employés, 64 per cent are classed as skilled and the remaining 36 per cent as unskilled, all helpers, laborers, and boys being included under the latter.

Ninety-two and one-half per cent are native born and the remainder, of foreign birth, are divided as follows:

	Per cent.
Ireland	2
Germany	1 6/10
Scotland	1 1/10
England	1
Ten different countries	2 5/10

Sixty-six per cent are married.

The total number of people depending for support upon the present employés is 2,776, which, with the employés themselves, makes a total of 3,711 and gives some idea of the importance and benefit of this establishment to a large number of the community in this respect.

	Per cent.
Under 25 years of age	19
Between the ages of 25 and 35	30
Between the ages of 35 and 45	19
Between the ages of 45 and 55	16
Over 55 years of age	16

The employés have naturally been drawn principally from the neighboring sections of the country, but many of them have now become residents of the District of Columbia. Classified by States according to residence when first employed they appear as follows:

	Per cent.
District of Columbia	58
Maryland	21
Virginia	5
Pennsylvania	5
New York	2
Scattering	9

DRAWING ROOM.

This part of the establishment has been taxed to the utmost, and notwithstanding that a large force of draftsmen has been employed it is impossible to get out the work fast enough. Detail drawings have been prepared of the gun mountings of the *Maine*, *Texas*, *Monterey*, *Amphitrite* and class, for mounts for rapid-firing guns, new types of breech mechanism, tools, machinery, hydraulic motors, and a vast amount of current work covering the details of equipments, accessories, experimental work, etc. Considerable work has been done on the plans of the mounts of the new cruisers of the larger class. As an indication of

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the quantity of work performed it is noted that 1,375 finished drawings have been made and nearly 12,000 blue-prints. This department has probably one of the finest and best equipped drafting rooms under the Government, with excellent facilities for carrying on work.

LABORATORY.

The laboratory, in charge of Mr. Lionel Lenox, is an important and indispensable adjunct. All articles required for these works that are susceptible of analysis are investigated there; and no difficulty is now experienced in preparing proper specifications or in ascertaining whether materials purchased are of suitable quality. All tests of metals, both physical and chemical, except the working of tool steel, are made and recorded in the laboratory. Tests of iron, steel, and other alloys are going on continually and are of great value.

A year's experience with cylinder and engine oils of our own compounding shows that no mistake was made in that direction, so far as the requirements of these shops are concerned.

A new testing machine of 200,000 pounds' capacity, and latest design, would be a valuable addition to this part of the establishment.

GUN SHOP.

This shop has been running from ten to twelve working hours each working day throughout the present year, the present force employed therein numbering 115. It has been worked to the full capacity of the machinery on guns of the following calibers, viz, 12, 10, 8, 6, 5, and 4 inch. The capacity of the shop as it stands at present is estimated as follows:

12 inch	3½	Or 6-inch only	84
10-inch	8		
8-inch	10	Or 12-inch	3½
6-inch	30	10-inch	10
		6-inch	45
Or 10-inch	16		
8-inch	8	Or 12-inch	5
6-inch	30	6-inch	72
Or 10-inch	16	Or 8-inch	24
6-inch	45	6-inch	30

Different arrangements of calibers will, of course, show different figures, as, for example, two 4-inch guns can be made in the same length of time that is required for one 8-inch. The estimated time under ordinary circumstances required to complete guns of different calibers is given below, with comparison with time required one and two years ago:

Gun.	Two years ago.	One year ago.	Present time.
	Days.	*Days.*	*Days.*
4-inch	.....	.....	48
5-inch	.....	.....	55
6-inch	144	75	60
8-inch	250	150	105
10-inch	300	205	150
12-inch	.....	.....	270
13-inch	.....	.....	*360

* Estimate.

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Showing a marked decrease in time; and it is possible that a still further reduction may be made.

The number of the guns now in the works completed and in various stages is as follows:

12-inch, of 35 caliber	4	6-inch, of 30 caliber	29
10-inch, of 30 caliber	11	5-inch, of 40 caliber	23
8-inch, of 35 caliber	4	4-inch, of 40 caliber	32
8-inch, of 30 caliber	1	6-pounder, field gun	5
6-inch, of 40 caliber	5		
6-inch, of 35 caliber	3	Total	117

There are also at the proving ground eight guns as follows:

10-inch, of 30 caliber	1	6-inch, of 35 caliber	1
8-inch, of 35 caliber	3	6-inch, of 30 caliber	2
6-inch, of 40 caliber	1		

It is believed that when the new lathes, now under construction, are received the heavier guns can be completed in less time than that given above—seven months will probably suffice for a 12-inch gun.

Active preparations are being made to take up the first set of forgings for a 13-inch gun, as soon as received; also, 8-inch guns of 40 caliber.

A table is appended to this report showing the total number of steel breech-loading rifles made for the new navy, and in process up to date.

The following new machines have been added to this shop during the past year: One lathe having a capacity for 10-inch guns, and one for 8-inch, a hoop lathe having a capacity for hoops of 16-inch guns. A rifling machine having a capacity for guns of 16-inch caliber or less, designed and built at these works, is nearly completed and will be in operation in a few weeks. The 10-inch rifling machine has been extended in length so as to take a 12-inch gun; this was necessary in order to rifle the first 12-inch gun which was ready in advance of the larger machine. The time required to rifle the first 12-inch gun was seventy-two hours. A 6-inch gun can be rifled in one day and a half, and 4-inch in ten hours.

The crane supports for the smaller cranes, which only extended as far north as the shrinkage pit, have been extended to cover the floor of the entire building; and a new fast-traveling 20-ton crane has been added, and has proved most useful and satisfactory. The railroad tracks enter this building at both ends, and cars can be loaded under the cranes and sent to any part of the country. The facilities for handling materials are excellent, and are all that can be desired.

The foundations for the new gun lathes, of which there are to be eight, are well advanced; five are completed and the rest will be by the end of the year.

Line shafting has been erected in both galleries of this shop, and a new 100 horse-power engine has been installed, which furnishes the power to drive all machinery in the galleries, the 40 and 20 ton cranes, and the 16-inch rifling machine.

Thirty-three machines, mostly lathes, shapers, milling machines, and screw-cutting machines for breech-mechanism work, have been placed in these galleries and are now in operation. Elevators have been put in on each side, and a stairway built to the east gallery.

The machine for "lapping" guns by power, recently designed and built here, has been completed, and as a labor-saving machine is a marked success.

The power to run this shop is furnished by one 150 horse-power and three 100 horse-power engines. A 250 horse-power engine has been

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ordered and will soon be delivered for running the heavy lathes to be installed in the north shop.

The crane service for this shop consists of three overhead traveling cranes of the following capacities: one of 110 tons, one of 40 tons, and one of 25 tons.

The machinery ordered and now under construction for this shop consists of—

One boring and turning lathe, having a capacity for 16-inch guns.
Two boring and turning lathes, having a capacity for 14-inch guns.
Three turning lathes, having a capacity for 14-inch guns.
Two boring and turning lathes for heavy jackets, hoops, or guns up to 10-inch caliber.

A new furnace is nearly completed in the shrinkage pit for producing hot air to be used in expanding forgings. By its use it is expected to be able to secure and maintain a uniform heat under easy and absolute control; to be free from flame or the products of combustion, and to be rid of the handling of fuel and dirt, which were inseparable from the old system, the iron pipes within the furnace and through which the air is driven being heated externally by hydrocarbon burners.

This shop, as well as all others except the pattern shop, is lighted when necessary by arc lights, rendering it practicable to work early and late as occasion requires.

GUN CARRIAGE SHOP.

The gun carriage shop has been fully occupied with the work naturally pertaining to it. Four, six and eight inch carriages have been constructed as fast as materials have been received; and also 10 and 12 inch turret mounts for the *Monterey* and *Maine*.

A 60-ton traveling crane, for the new proving ground at Indian Head, was constructed in this shop; also an 80-ton flat car, several gun platforms, turntables and pivot mounts for 10-inch and 12-inch guns, and a steel gangway for the barge belonging to the same place. At present a large steel target, having a face 16 feet long by 6½ feet high, is being built for the testing of armor.

This shop employs, at the present time, 129 men. A pair of 12-inch and a pair of 10-inch turret mounts for the *Monterey* are well advanced one of each being completed; and a pair of 10-inch mounts for the *Maine* are also well along.

This shop also performs a lot of miscellaneous work. It is covered by a 25-ton overhead traveling crane.

A table is appended showing the total number of mounts and carriages made or in process to date for the new Navy.

PROJECTILE SHOP.

This shop employs 75 men at the present time, and it is devoted to the manufacture of shell of and above 8-inch caliber, and to miscellaneous work; detail parts of gun carriages, hydraulic rammers and motors, bolt and screw-cutting, water testing and banding shell, etc. The machinery on the west side has been rearranged and it is now conveniently grouped and covered by trolleys to transport work easily and quickly from the railroad track which runs through the center of the shop.

The east side of this shop should be equipped with not less than a dozen new lathes suited for turning heavy shell. A projectile machine for centering, cutting off, nosing and tapping shell, is soon to be delivered for this shop.

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MOUNT SHOP.

This shop employs 67 men, and is largely devoted to the manufacture of mounts for guns for the secondary batteries of vessels. It has been worked to its fullest extent; and notwithstanding the addition of several new machines its capacity is too limited.

Shell up to, and including 6 inches in caliber are machined in this shop; and a banding press of 60 tons capacity is urgently needed, that the time and labor lost in carrying shell to another shop to be banded and bringing them back to be finished may be saved.

All firing locks, drill cartridges, practice barrels, field carriages and tripods are made in this shop; also such miscellaneous articles as loading trays, sponge and rammer heads, shell-bearers, etc.

A table is appended showing the total number of mounts made, and in process, for small guns.

TOOL ROOM.

This branch employs 56 men, including the blacksmiths employed exclusively as toolmakers and dressers. It is well equipped with new and excellent machinery, and still it is found difficult to meet the demands made upon it. All the tools for the establishment are prepared, kept in order and recorded in this division. Great accuracy and careful workmanship, coupled with good materials are indispensable to turn out satisfactory tools, for gun-making; but it is believed that the requirements are entirely met. Numerous special tools, such as rifling heads, spiral reamers for cutting gas-check slopes, long tapered reamers for chambers of rapid-firing guns, tools and instruments for inspecting purposes, standard gauges and templates, and boring and turning tools, are turned out as required; and many improvements have been made in designs during the year, also in the manipulation of metals. Pressure gauges for small arms and large guns are made here.

A separate smithy for the toolmakers has been established and equipped with the necessary number of forges and a new steam hammer of the most improved type. An annealing and case-hardening furnace has been built, also a furnace for lead-tempering and the necessary oil and brine tanks.

A small crane is needed to use in conjunction with the steam hammer.

BREECH-MECHANISM SHOP.

This shop employs 123 men and is the old ordnance machine shop; it has the disadvantage of being badly lighted and badly ventilated. The floor overhead should be removed and some skylights put in the roof. It requires a new floor and a new line shafting to put it in first-class order. As its name indicates, it is used for the manufacture of breech mechanism; and also for sights, fuses, primers, and a great deal of miscellaneous work.

Several of the best small tools have been removed to the galleries of the gun shop, which is in fact a part of this shop, so far as the distribution of work is concerned. Should it become necessary at any time to increase the capacity of the gun shop for small guns, the necessary lathes could be installed in this building, which is the only one that would be available. Some 6-pounder field guns have also been manufactured there during the past year.

COPPERSMITH SHOP.

This shop employs 35 men, and is devoted to the manufacture of powder tanks and copper pipes for turret mounts. Three thousand five

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hundred and ninety-five cylindrical powder tanks have been made during the past twelve months.

FOUNDRY.

The foundry employs 89 men, and has been busily employed in casting shell and miscellaneous ironwork amounting to a total weight of 2,785,107 pounds during the year. Brass and bronze castings for top carriages, saddles for heavy guns, for recoil mounts, and for miscellaneous purposes have been made, amounting to 405,362 pounds.

The number of projectiles cast during the past twelve months is 10,708, classified as follows:

12-inch proof	18	6-pounder service	100
10-inch proof	2	3-pounder service	100
10-inch service	647	1-pounder service	100
8-inch service	1,165	8-inch M. L. R	116
6-inch service	3,938	8-inch Shrapnel	147
5-inch service	1,813	6-inch Shrapnel	103
4-inch service	1,813	3-inch Shrapnel	51
3-inch service	240	11-inch mortar	9
60-pounder service	279	8-inch solid	4

Total weight, 1,831,431 pounds, included in the above.

Considerable improvement has been made in casting shell, and the number rejected on water test or lost on account of imperfect casting is now comparatively small.

A new and small cupola of more modern design than those now in use would be an improvement.

It is found difficult to obtain iron having the necessary strength and density for casting shell in the open market, and but few of the samples submitted have reached the required standard. Suitable iron has, however, been obtained.

FORGE SHOP.

This shop employs 45 men and has been busily engaged on the detail work, both iron and steel, pertaining to the various articles in process of manufacture in other shops. Shield plates for carriages for guns of 8-inch caliber, and less, are bent and fitted there.

This shop, occupying the southwest corner of the large building known as the quadrangle, in which is situated the gun carriage, projectile, and mount shops, is a menace to them, and should ultimately be removed to a separate building.

PATTERN SHOP.

This shop employs 66 men, and is devoted to pattern making and joiner work. All targets and backing are there turned out, and it has been hard pressed to keep pace with the requirements of the other shops.

COPPER-ROLLING MILL.

This shop has been in operation several months during the year, refining and rolling copper for powder tanks and shell bands, and getting out sheathing, copper nails, etc., for other departments. The rolling of shell bands is a new branch, and has resulted in a considerable saving. Several thousand have been made during the year.

The boilers are in good condition and automatic damper regulators have recently been applied to the stacks, with a view of economizing, as far as possible, the consumption of fuel.

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MATERIALS.

Twelve hundred tons of gun steel have been received during the year with regularity and in sufficient quantity to keep the gun lathes continually at work. Only 6 tons have been rejected, equal to one-half of 1 per cent, which speaks well for the manufacturers.

Steel castings for mounts, carriages, and deck circles are less frequently delivered, and the delay in this respect has proved a source of some embarrassment. The system of inspection is very rigid, and has resulted in the rejection of 84,199 pounds out of 502,430 pounds received, equal to 16.7 per cent. The steel companies, however, by repeated efforts, succeeded in replacing it with sound and excellent castings.

MACHINERY.

The number of new machines added to the plant during the year is 83, divided as follows:

Lathes	30	Grinding machines	3
Drills	10	Milling machines	3
Shapers	13	Slotting machines	2
Screw machines	6	Miscellaneous tools	14
Planers	2		

The total number of machines of all kinds is 405. A table is appended showing the number and kind in each shop.

Among the principal objects which have been in progress during the past year may be enumerated the following:

Designing and developing mounts and breech mechanism for 10-inch and 12-inch guns; developing designs of breech mechanism for rapid-firing guns, and mounts for the same; completion of the first 12-inch gun and mount; of the first 10-inch mount of Mark II pattern; of the first 35 and 40 calibers, 6-inch guns; of the first 4-inch and 5-inch rapid-firing guns, and of the first 6-pounder field-gun; manufacturing guns of various calibers of standard types; 10 and 12-inch mounts; 4, 5, 6, and 8 inch carriages and shields; 1, 3, and 6 pounder recoil mounts; projectiles of all calibers up to and including 12-inch; powder tanks; miscellaneous articles for outfits of vessels now building; fuses, primers, gun platforms, car, crane, turntables, and proof mounts for the proving grounds, and building targets for armor and projectile tests; experiments with fuses, primers, water motors, etc., and treating armor plates by the "Harvey process."

SEAMEN GUNNERS.

The class of seamen under instructions has averaged 28 per month, the greatest number being 38 and the lowest 18 at the end of any month. Eighty-seven have been under instruction during the past twelve months, of which 55 have qualified as seamen gunners, so far as this point of their training is concerned.

The question of storage room for finished guns, carriages, and other materials will soon become a serious one. Heretofore there has been space in the unoccupied shops; but as they are gradually being filled with machinery, they are no longer available for such purposes; and the building known as store No. 10 should, when practicable, be put in proper condition for this purpose.

While it is due to all the officers to credit them with unremitting at-

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tention and zealous coöperation, it is especially so to Lieut. Commander Pendleton, whose indefatigable labors entitle him to special mention.

Very respectfully, your obedient servant,

CHARLES O'NEIL,
Commander, U. S. Navy, Inspector of Ordnance.

The COMMANDANT,
Navy-yard, Washington, D. C.

Mounts for guns of secondary battery completed and in process October 15, 1891.

	Completed.	In process.		Completed.	In process.
6-pounder:			1-pounder (37 m/m, H.R.C.:)—Cont.		
Hydraulic recoil carriages	39	60	Bronze tripod stand	1	.....
Cast steel cage stands	18	.....	Rail sockets bronze	27	.....
Sliding pivot sockets	4	.....	Top shelf mounts	24	.....
Rail sockets	8	4	Wooden tripods (boat)	17	.....
Field carriages	2	3	Wooden tripods (deck)	15	2
3-pounder:			Cast steel stands	1	10
Hydraulic recoil carriages	33	10	Field carriages	17	.....
Cast steel cage stands	9	.....	47 m/m (H. R. C.:)		
Sliding pivot sockets	14	.....	Tower mounts	12	.....
Rail sockets	2	.....	Bronze cone stands	4	.....
Tower mounts	4	.....	37 m/m (H. R. C.:)		
1 pounder (37 m/m H. R. C).:			Pivot saddles (bronze)	12	.....
Hydraulic recoil carriage	.....	31	Cone stands (bronze)	6	.....
Rolled steel cone stands	12	.....	Top mounts trolley	2	.....
Bronze cone stand	1	.....	Field carriages with limbers	6	.....

Gun carriages and mounts, main battery, thus far completed and in process, October 15, 1891.

	12-inch.	10-inch.	8-inch.	6-inch.	5-inch.	4-inch.	Total.
Completed	1	5	16	100	1	2	125
In process	1	3	1	2	.....	1	8
Total	2	8	17	102	1	3	133

Also one 8-inch and one 6-inch for the Bethlehem Iron Company, and one 6-inch carriage for Messrs. Du Pont & Co.

Steel guns manufactured for the Navy, and in process, October 15, 1891.

Condition, etc.	12-inch (35 cal.).	10-inch (34 cal.).	10-inch (30 cal.).	8-inch (35 cal.).	8-inch (30 cal.).	6-inch (40 cal.).	6-inch (35 cal.).	6-inch (30 cal.).	5-inch (30 cal.).	5-inch R. F. (40 cal.).	4-inch (40 cal.).	4-inch D. S. (40 cal.).	4-inch R. F. (40 cal.).	6-pdr. field gun.	
Completed	1	2	6	9	5	1	2	91	2	1	4	2	1	5	132
Nearly completed	2	....	2	1	....	1	....	1	....	5	....	....	4	....	16
Assembled and partly completed	1	....	2	1	....	3	1	5	....	13	....	....	9	....	35
Forgings received and in hand	....	....	2	1	....	1	3	2	....	8	....	....	2	....	19
Total made, etc., at Washington navy-yard	4	2	12	13	5	6	6	99	2	27	4	2	16	5	203
Made by contract	....	....	....	....	4	....	....	23	....	....	....	....	....	....	27
Totals	4	2	12	12	9	6	6	122	2	27	4	2	16	5	229

In addition to the above, one 8-inch of 35 caliber and one 6-inch of 35-caliber have been built for the Bethlehem Iron Co., and one 6-inch of 35 caliber for Messrs. Du Pont & Co.

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Machinery in various shops.

Kind.	Gun shop.	Gun carriage shop.	Erecting shop.	Projectile shop.	Mounting shop.	Boilermakers shop.	Gallery gun shop.	Tool room.	Forge shop.	Pattern shop.	Electric plant.	Copper mill.	Laboratory.	Foundry.	Total.
Cranes	3	1	....	....	....	....	....	....	....	....	....	....	....	....	4
Engines	8	3	....	1	....	1	....	....	....	1	2	2	....	2	20
Lathes	32	2	2	44	28	38	11	12	....	....	....	....	....	....	169
Shapers	1	9	....	3	5	10	14	3	....	....	....	....	....	....	45
Milling machines	....	....	....	....	2	3	3	2	....	....	....	....	....	....	10
Turret lathes	....	....	....	....	3	1	4	....	....	....	....	....	....	....	8
Slotters	....	7	....	....	....	1	1	....	....	....	....	....	....	....	9
Drill presses	....	3	2	7	4	5	3	1	....	....	....	....	....	....	25
Planers	....	8	3	3	3	3	....	....	....	....	....	....	....	....	20
Bolt cutters	....	....	....	4	....	1	....	....	....	....	....	....	....	....	5
Grinding machines	....	....	....	....	....	1	....	6	....	....	....	....	....	....	7
Vertical boring mill	....	4	....	....	....	....	1	....	....	....	....	....	....	....	5
Rifling machine	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Lapping machine	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Screw box slotter	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Horizontal boring mill	....	7	2	1	1	....	....	....	....	....	....	....	....	....	11
Screw cutters	....	....	1	4	....	....	....	....	....	....	....	....	....	....	5
Hydraulic presses	....	....	2	1	1	....	....	....	....	....	....	....	....	....	4
Metal band saws	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Saw fitter	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Nut tappers	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
Nut facers	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Emery wheel grinder	....	....	....	....	1	....	....	1	....	....	....	....	....	....	2
Die sinker	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
Wood turning lathes	....	....	....	....	....	....	....	....	....	9	....	....	....	....	9
Steam hammers	....	....	....	....	....	....	....	1	4	....	....	....	....	....	5
Blowers	1	....	....	....	....	....	....	....	2	....	....	....	....	3	6
Punching and shearing	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Band saws	....	....	....	....	....	....	....	....	....	4	....	....	....	....	4
Circular saws	....	....	....	....	....	....	....	....	....	2	....	....	....	....	2
Surface planers	....	....	....	....	....	....	....	....	....	4	....	....	....	....	4
Molding machines	....	....	....	....	....	....	....	....	....	2	....	....	....	....	2
Boring machines	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Mortice machines	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Dynamos	....	1	....	....	....	....	....	....	....	....	6	....	....	....	7
Air compressors	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Testing machines	....	....	....	....	....	....	....	....	....	....	....	....	3	....	3
Totals	50	45	12	73	48	64	37	27	7	24	8	2	3	5	405

Aggregate horse-power of the engines	1,532
Aggregate horse-power of the 16 boilers	1,813

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ANNUAL REPORT OF INSPECTOR IN CHARGE ORDNANCE PROVING GROUND, ANNAPOLIS.

NAVAL ORDNANCE PROVING GROUND,
Annapolis, Md., September 30, 1891.

SIR: I have the honor to submit the following report of the work done at this station during the past year:

Routine work.

Class and caliber.	Number of guns proved and passed.	Powder inspected and passed.	Total number of rounds fired for all purposes.
		Pounds.	
4-inch B. L. R.	8		122
6-inch B. L. R, Mark III	21	90,000	210
8-inch B. L. R, Mark III	1	75,000	91
1-pounder R. F. and 37 R. C		8,400	128
3-pounder., R. F		21,000	108
6-pounder R. F		24,000	645
Ignition		10,000	
Old armament		5,000	75
Total	25	233,400	1,379

The most important experimental work has been that in connection with the development of American armor plates and armor-piercing projectiles.

ARMOR PLATES.

In order to determine the effect on nickel steel of the ordinary cold weather armor plates in service are liable to experience, in November last, two more Holtzer 6-inch armor-piercing projectiles were fired at the nickel steel plate used in the competitive trial the previous September. The striking velocity for each shot was 2,055 foot seconds and all the elements the same for both, except that the first was fired while the plate was at the temperature of the surrounding atmosphere (53° F.) and the second after it had been cooled by means of a freezing mixture to 28° F. Little difference was observed in the effects of the two rounds. The penetration was about the same; cracks resulted from both rounds, but there was no marked difference in the amount or character. This result alone was not altogether conclusive, as the plate had been considerably weakened by the five impacts received in the competitive test, and the temperature reached was not as low as desired. Any choice, however, in resisting qualities to cracking in the neighborhood of points of impact was in favor of that used for the round at normal temperature. The inferences drawn were confirmed by subsequent physical tests conducted by Prof. N. M. Terry, U. S. Naval Academy, where a temperature as low as freezing mercury was reached.

The small 6-inch steel plate, 30 by 24 inches, treated by the Harvey process of surface carbonization, which gave such excellent results during the preceding year, when 6-pounder armor-piercing shell were used, was attacked in November with a 4-inch solid steel shot, striking velocity 1,900 foot seconds. The depth of indent was only 1¼ inches; through cracks detached one-fourth of the plate. The projectile, however, proved to be of poor quality.

The following February, a test was made of a 10-inch Schneider all-

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steel plate, 6 by 8 feet, which had been treated by the same process at the Washington navy-yard. The 6-inch B. L. R. of 35 calibers length was used, the striking velocity being 2,065 foot seconds. The plate was at an angle of 13° from a normal to the line of fire. It was attacked by three Holtzer and four Carpenter armor-piercing shell. At the end of the sixth round, although badly cracked, none of the plate had left the backing. At the seventh and last round about one-eighth of the plate fell to the ground. With the exception of one round, the greatest penetration obtained was about 4 inches; in the one round excepted (point of impact, centre of plate, Holtzer projectile) the point of the shell entered the wood backing 3 inches. All the projectiles were broken up. Little or no fringe was raised and no tendency was shown on the part of the carbonized hard face to separate from the back. These results may be considered remarkable. As it is claimed the carbonization can be carried to any extent desired, the cracking can probably, in a large measure, be prevented by starting with a lower steel. If certain mechanical difficulties can be overcome, the Department seems in a fair way to obtain an armor plate of purely American invention superior to any of foreign make—virtually, a compound plate with a very hard projectile breaking face, the softer back to resist fracture, being reached by regular and gradual changes in the character of the same material, there being no artificial weld or sharp line of demarcation tending to separation.

As a further test of the effect of the Harvey treatment on both steel and nickel steel plates, a trial was made in May of five 3-inch plates 6 by 8 feet, manufactured by Carnegie, Phipps & Co. Two of these plates were of all steel 0.51 per cent and 0.62 per cent carbon, and three of nickel steel; two of the latter with 3.12 per cent nickel, 0.51 and 0.40 per cent carbon, and one 2.53 per cent nickel 0.30 per cent carbon. The 0.51 carbon all steel and the 3.12 nickel 0.51 carbon nickel steel had been treated by the Harvey process. With the exception of the 0.62 carbon all steel plate, which was used up at the end of the tenth round, twenty-one rounds from a 6-pounder H. R. F., with French armor piercing shell, striking velocity 1,804 foot seconds, were fired at each plate. The results with the nickel steel treated by the Harvey process were most excellent. The indents averaged but from $\frac{1}{8}$ to $\frac{1}{4}$ inch deep, and only one crack was developed. The two other nickel steel plates confirmed the results heretofore obtained, showing the benefits of nickel in increasing the resistance to fracture. The five plates were placed in the following order for relative invulnerability:

	Carbon.	Nickel.
	Per cent.	*Per cent.*
(1) The nickel steel, Harvey treated (with a marked superiority over all others).	0.51	3.12
(2) The nickel steel	0.40	3.12
(3) All steel, Harvey treated	0.51	.....
(4) Nickel steel	0.30	2.53
(5) All steel	0.62	.....

The plate placed first in order was subsequently attacked by three 4-inch armor piercing projectiles, with a striking velocity of 1,800 foot seconds. Penetration was of course met with, but the number of cracks were small.

Better results would probably have been obtained had lower carbon plates been taken for treatment by the Harvey process. This is es-

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pecially true of the all steel plates, as the nickel to some extent overcomes the tendency to fracture. This was shown by the test, in July, of two 3-inch plates, 6 by 8 feet, also manufactured by Carnegie, Phipps & Co. These plates were of 0.25 per cent carbon and had been treated by the Harvey process. The elements of attack were the same as in the test of the five plates, except that only fourteen rounds were fired at each plate and that American 6-pounder projectiles were used in place of the French, the former having proved superior. The depths of indent were from 1 inch to 1¼ inches, and no cracks whatever were developed.

In January a test was made for the information of the Bethlehem Iron Company of a 11½-inch plate, 6 by 4½ feet, of their manufacture. Six-inch Holtzer projectiles were used with striking velocities of 2,032 and 2,065 foot seconds, an 8-inch gun not being available at the time. The test is chiefly of interest as being the first of a heavy plate of American manufacture. Although the plate was too thick for the caliber used against it, as far as could be judged it proved to be of very good quality.

In July an information test was held for the benefit of Carnegie, Phipps & Co., of four 6-inch plates, 42 inches square, of nickel steel, subjected to different treatments. Four inch Carpenter steel armor-piercing projectiles, with striking velocities of 1,913 to 1,957 foot seconds, were used against these plates.

ARMOR PIERCING PROJECTILES.

Six-inch armor piercing shell, presented by the Sterling Steel Company and the Redemann Tilford Company, were tested in November with poor results.

Experimental tests were commenced in January of the 6 and 8 inch armor piercing shell manufactured by the Firminy process, by the Carpenter Steel Company, of Reading, Pa., under the contract with the bureau. This company continued to improve in the results obtained with each succeeding lot, and in April the first reception test for 6-inch projectiles was made. Since that date five lots of 6-inch and three of 8-inch have passed the ballistic test and have been accepted. A 10-inch Schneider all steel plate and the *Miantonomoh's* 11½-inch test plate were expended in the experimental work, and two Schneider and one Bethlehem 8-inch steel plates, and one Schneider and one Bethlehem 6-inch steel plates, in the reception tests. The shells as delivered at present are quite equal to the Firminy shell of English make.

A number of 4-inch armor piercing shell have also been received from this (the Carpenter) company and used in various experiments against smaller armor plates, but none have been presented for official test.

For rapid-fire guns of smaller caliber experimental tests have been made of electrically welded 6-pounder armor piercing shell presented by the Thomson Electric Welding Company; of 6-pounder steel armor piercing shell manufactured by the Sterling Steel Company; and of 3-pounder armor piercing shell of special design (spiral punch head) presented by Mr. D. L. Kennedy. The first mentioned only gave any promise of ultimate success.

POWDER.

Messrs. Dupont & Co. have continued to deliver successful lots of 6 and 8-inch prismatic powders for inspection. The works have now entirely recovered from the effects of the serious explosion of last year.

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The press for the smaller grain prismatic for use in 5-inch rapid-fire guns has been completed, and sample lots of the powder manufactured.

A new square grain powder for rapid-fire guns of smaller caliber, consisting of brown powder coated with black, manufactured by the Duponts, has been tested with very promising results. Messrs. Laflin & Rand have presented three samples of prismatic powder for test in 6 and 8 inch B. L. R., which met with better success than heretofore experienced by this company, but failed to meet the requirements of the Bureau.

In connection with experiments at the torpedo station and at Indian Head, a few tests have been made of the Maxim smokeless powder in small arms and the 1-pounder rapid-fire gun. Also of the smokeless powder developed at the torpedo station, in caliber .30 and caliber .50 rifles and the Hotchkiss 6-pounder; promising results were obtained from the latter, but more promising data has been obtained elsewhere.

Opportunity has been taken in the routine firing in proof of powder, guns, etc., to collect as much data as possible, bearing on the application of the best known theoretical formulæ to Dupont's brown powders in use in the service. Tests are also made from time to time to ascertain the keeping qualities of these powders. The results with powders manufactured three years ago are very satisfactory.

GUNS AND MOUNTS.

Partial tests have been made of the 4-inch rapid-fire guns with Driggs-Shroeder breech closure and with that designed by Ensign R. B. Dashiel, U. S. Navy. At the time the first-mentioned system was tried, no suitable cartridge case could be obtained for the gun, and a fair judgment of its merits can not be given. The Winchester Repeating Arms Company have since succeeded in furnishing a satisfactory case.

The Dashiel system, although it has received only a preliminary trial and may require some minor changes, has fully demonstrated that it can be worked to a successful issue.

In June the first of the Driggs-Shroeder 6-pounder rapid-fire guns, delivered under contract with the Bureau, was given the endurance test of 200 rounds in four successive hours, required by that contract. In the following month it received a farther test of 94 rounds in twenty-two minutes. Both tests were passed successfully. In the rapid-firing test an average rate of one round in three and one-half seconds was maintained for 61 rounds, with an untrained crew.

In connection with the endurance test given above, a trial was made of the recoil mount for 6-powder trunnionless guns, designed at the Bureau. The strength and endurance proved ample, and the mount is light, compact, and neat in appearance.

Cast steel cage stands of new designs, for 6, 3, and 1 powder rapid-fire guns, and a new design for tripod for Gatling gun, have been successfully tested during the year.

In November last the second trial of the pneumatic gun carriage for 8-inch B. L. R. took place at this station before a board appointed to witness and report on the trial. The carriage was accepted on the report of this board as technically complying with the specifications of the contract, although its many disadvantages for use in service were stated. It has since been occasionally used with low charges, in the test of projectiles, and has given much trouble. Besides the theoretical disadvantages given by the two boards, it requires the attention of a skilled mechanic to keep it in working order. Unlike the service carriage, which

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is ready for use at all times, it requires sufficient time to get up steam to maintain the pressure in the recoil cylinders before it can be used even when worked by hand. If the engine or air pump prove to be out of order, or accidents happen to them, as has twice occurred, the carriage is useless for the time being. It is difficult to keep the joints and packing air-tight, and to maintain the pressure in the recoil cylinders for any length of time. When the training engines can be made to work, they can not be used for fine training, and their use has been discarded altogether, using only the hand gear.

RANGE TABLES.

Range tables have been computed for the 35 caliber 10-inch B. L. R., the special 8-inch B. L. R. designed for the *Lancaster*, and the 35 caliber 6-inch B. L. R. for full and reduced charges for each. These theoretical tables have been partially checked by firing data. The construction of the new light-house off Greenbury Point, which lies almost directly in the old line of fire, has rendered the collection of firing data for practical range tables, heretofore attended with difficulties, almost impossible in the future.

MISCELLANEOUS.

Other work at the station during the year has been the trial of a range-finder designed by Prof. Michelson; the test of friction and electric vent-sealing primers of new design; of base percussion fuses for breech-loading rifle and the Driggs fuse for rapid-fire projectiles; of the Driggs common shell and a conglomerate shot designed by Ensign Ackerman; of Bisbee's accelerating cartridge for small arms; ballistic tests of castings; tests of various minor parts of breech mechanism and mounts for guns, etc.

Lieuts. F. E. Greene and W. A. Gill and Gunner P. Lynch have been attached to the station during the entire year and have rendered much valuable assistance in the work done.

During the year the greater part of the work formerly done at this station, including the test of powder, guns, and mounts, has been gradually transferred to the new proving ground at Indian Head, until at the present time there is little to be done here except to utilize the old target structures while they last in the tests of armor-piercing shell and small armor plates.

The greater part of the material that could be made use of elsewhere has been transferred, as opportunity occurred by Government conveyance, and the station is in such a condition it could be closed at any time with a week's notice and be placed in the hands of a watchman.

I am, sir, very respectfully,

J. H. DAYTON,
Lieutenant-Commander and Inspector of Ordnance, in charge.

CHIEF OF BUREAU OF ORDNANCE,
Navy Department, Washington, D. C.

U. S. NAVAL ACADEMY,
Annapolis, Md.

Forwarded September 30, 1891.

R. L. PHYTHIAN,
Captain, U. S. Navy, Commanding Station.

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ORDNANCE PROVING GROUND, INDIAN HEAD—REPORT OF INSPECTOR IN CHARGE.

NAVAL ORDNANCE PROVING GROUND,
Indian Head, Md., September 19, 1891.

SIR: I have the honor to submit the following report of the operations of this station during the current year:

GENERAL WORK.

The marsh in the valley has been drained, the stream confined between two walls of piling, and the level of the valley raised with earth to a height of 6 feet above low water. The highest freshets on record have never risen more than 4 feet above low-water mark. A sea wall of piles has been built, completely inclosing the water front. The hills on each side are being shaped to suit the purposes of the station.

A railroad has been built for the traveling crane and flat cars, connecting the wharf and slip with the velocity and range and armor batteries. A firing butt of heavy timbers lined with steel plates has been erected and is in satisfactory operation.

The velocity battery has cast iron platforms for carriages of 4, 5, 6, and 8 inch guns, a hydraulic mount for 10-inch guns completed, and another nearly finished for the 12-inch gun. The range and armor batteries have platforms for all pivot carriages. The construction of hydraulic mountings for these batteries will soon be commenced.

Three commodious bombproofs have been built. An explosion chamber has been three-fourths completed.

A large boiler and hydraulic pumping plant have been installed. The chronographs and their circuits have been set up and completed. Roads have been constructed where necessary, and the brush and undergrowth cleared out where possible.

Chronograph house, magazine, storehouse, stable, and other necessary buildings have been erected.

A large steam launch has been acquired by purchase.

PROOF OF GUNS AND MOUNTS.

The first gun, a 6-inch B. L. Rifle, was proved January 24. One 4-inch rapid-fire gun, ten 6-inch and one 8-inch, with their carriages, have been proved to date. The hydraulic mount of the *Miantonomoh* has been tested, with two of her 35 caliber 10-inch guns, and shipped to that vessel.

Among the 6-inch guns was one of 40 calibers in length. A muzzle velocity of 2,180 foot seconds, with 14.7 tons pressure, was obtained with this gun, using a charge which gave 2,000 foot seconds in the ordinary 30 caliber gun.

POWDER PROOF.

Samples of powder for all calibers have been tested. Most interesting and important results have been obtained with samples of smokeless powders from the torpedo station. These powders were fired with very satisfactory results in the 3 and 6 pounders and 4-inch rapid-fire gun.

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PROJECTILE TESTS.

Preparations are nearly completed for the erection of a 10-inch steel plate for the reception test of 10-inch Carpenter armor-piercing projectiles. Case shot for the 6-pounder have been tested, and a satisfactory percussion base fuse has been proved in the 6-inch gun, firing down the range.

TARGET STRUCTURES.

Three target structures for the new American armor-plate trials have been put up, and are now awaiting the arrival of the plates. A heavy curved face structure has also been erected for the reception tests of the barbette armor for the *Monterey* and other monitors.

ARMOR TESTS.

Two pairs of plates, of steel and of nickel steel of American manufacture, representing cruiser protective decks, have been fired at with the 6-inch gun. The angle of impact of the shell was 22 degrees with the surface of the plates.

Both plates caused the common shell to glance off, but the steel plates were very much more indented than the nickel, upon which only a slight mark was left by the projectiles. A steel armor-piercing shell was then fired at the center of each plate, the nickel being struck with 11 per cent greater energy of blow than the steel. The shell glanced harmlessly off the nickel plates, while a large hole was smashed through the steel plates, through which the shell passed destroying the oak backing and timbers, and penetrating 8 feet of clay beyond. Below the impact was such a mass of wreckage as to leave no doubt of the immense superiority of nickel steel over ordinary tough steel for protective deck armor.

All officers attached to the station have contributed by their zeal and ability to the satisfactory progress made.

Very respectfully, your obedient servant,

R. B. DASHIELL,
Ensign U. S. Navy, Inpector of Ordnance in Charge.

The CHIEF OF BUREAU OF ORDNANCE,
Navy Department.

NAVAL TORPEDO STATION, NEWPORT R. I., ANNUAL REPORT OF INSPECTOR IN CHARGE.

NAVAL TORPEDO STATION,
Newport R. I., September 15, 1891.

SIR: I have the honor to submit the following report of the work of this station during the past year:

The list of officers attached to the station and the general distribution of the work remains as at the date of my last annual report, viz:

Lieut. Commander H. W Lyon, in general charge of buildings and grounds, boats, boathouses, wharves, etc.; the supervision and discipline of the enlisted men; the detail of seamen under instruction, in the different branches and the general supervision of the course of instruction; and the immediate charge of the instruction in diving.

Lieut. Commander W. I. Moore, in charge of the machine shop and

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gun-cotton factory; the preparation of outfits; the manufacture of primers and detonators, and the instruction in fuse-making.

Lieut. T. C. McLean, in charge of the electrical laboratory and dynamo room, and all electrical plant; of experimental electrical work, and instruction in electricity.

Lieut. W. A. Marshall, in charge of general torpedo work; the inspection of torpedo outfits and of magazines and manufactured explosives, and instruction in torpedo work, countermining, etc.

Prof. C. E. Munroe, chemist, in charge of the chemical laboratory; the manufacture of fulminate of mercury and the charging of detonator cases; the manufacture of smokeless powders and other explosives, and the testing of gun cotton in the different stages of manufacture.

Lieut. M. E. Hall, attached to the station for duty in connection with the manufacture of a torpedo of his own design, has been employed in experimental work as his services were required.

Surg. Paul Fitzsimons, the medical officer of the station.

Passed Assistant Paymaster T. J. Cowie, general storekeeper.

Boatswain Stephen McCarthy has been under instruction a part of the year and has given valuable assistance in experimental work and in the instruction of seamen.

As the period of service at the station of Lieut. Commander Moore is drawing to a close I take this occasion to say that his great mechanical ability, his familiarity with the operations of the station for many years, and his intimate knowledge of the processes of manufacturing gun cotton, will cause his detachment to be greatly regretted by me.

TORPEDO BOAT STILETTO AND OTHER BOATS.

During the year a new boiler built by the Almy Water-Tube Boiler Company of Providence has been placed in the *Stiletto*.

The new boiler, in its general characteristics, resembles the Thornycroft boiler for torpedo boats, but is so constructed that injured parts may very readily be replaced. It has also the advantage of a greatly reduced first cost. Tests of the evaporative capacity of this boiler have been made, the results of which will be submitted to the Bureau in a short time.

The engines of the *Stiletto* will require some overhauling when the boat is taken out of the water for the winter. When this has been done the boat will be in good condition for several years' service.

While being dispatched to the relief of the U. S. S. *Galena* and tug *Nina*, which vessels were stranded on the southwest side of the island of Marthas Vineyard, in March last, the *Triana* was run upon a ledge off Cuttyhunk and totally wrecked. The loss of this vessel has been a great inconvenience to the station. She furnished most excellent quarters for the enlisted men, who since her loss, have been most uncomfortably quartered in storehouse No. 2, and in the second story of the machine shop. Besides which the services of a tug are almost indispensable in torpedo work, and it is hoped that a vessel to take the place of the *Triana* may soon be ordered to the station.

The ferry launch is in excellent condition. The torpedo and other launches have been kept in repair and are in as good order as boats of their long service can be expected to be.

BUILDINGS AND PLANT.

All the buildings are in good repair.

A new floor, supported on numerous brick piers and with new and more frequent cross beams, has been laid in the machine shop. This

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was a greatly needed improvement, the old floor being so weak that the heavier tools could not be kept in line or firmly in place.

The tools have been reset and the following additions to the shop plant have been made: One 34-inch engine lathe; one 18-inch engine lathe; one 10-inch engine lathe; one 36-inch upright drill; one sensitive drill; one universal grinding machine; one shaping machine; one set bending rolls, and one combined punch and shears. The shop is now prepared to do a much greater variety of work than could have been undertaken before these additions were made, and a greatly increased number of men could be employed should the necessity arise.

One upright drill and one 16-inch lathe, worn out and unservicable, have been removed from the shop.

A shed, which serves also as a workshop, with launching ways, has been built for the Patrick torpedo, which, with the old boat house, will serve as a storage place for the three torpedoes of that type.

In order to furnish a place for the manufacture of smokeless powders for experiment, so that the work could be separated from the general chemical work, a small frame building has been erected. An old oscillating engine has been repaired and set up in this house to drive an incorporating mill and other smaller machines. A mill of larger capacity has been ordered, and purifying, cutting, and finishing apparatus for the manufacture of the station smokeless powder, the latter built at the station, have been erected in this building.

Until a larger factory for the manufacture of smokeless powders shall be established, this small plant, with some small additions already authorized by the Bureau, will be sufficient to turn out a moderate quantity of the powder for the use of the service.

The main engines, pumps, and connections are all in good order. The brickwork about the main boilers has been partially renewed and the boilers are now in good condition. The improvement in the condition of the boilers by discontinuing the use of water condensed from the waste steam, which contained more or less oil, has been marked.

A small furnace has been built for the manufacture of calcium phosphide for use as a detecter of the path of submerged torpedoes.

GUN-COTTON FACTORY.

The capacity of the gun-cotton factory has been very nearly doubled by the addition of an enlarged drying room and another set of cooling troughs. As previously arranged the capacity of the different parts of the factory was unbalanced, the facilities for drying and nitrating the cotton being much inferior to those for the other operations. The additions referred to will, in a great measure, correct this inequality. The factory can now readily produce 5,000 pounds of gun cotton per month by a small increase in the number of employés, and, in case of necessity, by working continuously day and night, this output could be increased. A new centrifugal drierof larger capacity than the one replaced has been added to the plant. The factory as it stands is by no means an ideal one, but many of its most glaring defects have been remedied. Much trouble has been experienced in properly ventilating the dipping room, especially during the hot and damp days of the past summer. The acid fumes passing over the ventilating fan causes its rapid deterioration, and another method of producing the necessary current of air for removing these fumes is now under consideration.

Owing to the prolonged dry weather of the spring and summer the cisterns on the island became exhausted early in the year and the

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water main connected with the Newport waterworks system had to be depended on for the water supply. The Newport water, however, became so bad toward the end of the summer, on account of the low-water level in the pond from which it is drawn, that it was unfit for use in the manufacture of gun cotton, which was consequently suspended.

Rain water, collected in cisterns, seems to be the most suitable for use in making gun cotton. There are two buildings on the island, the boat house and the coal shed, having considerable roof area, from which the water goes to waste. A scheme for building a cistern to contain the water collected from these roofs is now under consideration, in which the windmill pump, now standing over a dry well, can be utilized for pumping the water to desired points.

GUN-COTTON MAGAZINE ON ROSE ISLAND.

The magazine on Rose Island, used for the storage of gun cotton, should be renovated and ceiled. At present it is not well ventilated, and it becomes very damp in any except the driest weather. Racks to hold the stored gun cotton should be put up, and more substantial doors and windows should be provided for it. It has been broken into during the past year, and a small quantity of wet gun cotton abstracted from it. The light-house keeper, who is the custodian of the island, seems to be unable to prevent this and other annoyances, such as the spiking of the 20-pounder rifle gun used for experimental firing, the bending of its sights, etc.

TORPEDO OUTFITS, ETC.

The supply of torpedo outfits has been maintained during the year. Outfits and partial outfits have been furnished to the *Lancaster*, *Marion*, *Miantonomoh*, and *Yantic*, to the Naval Academy, and to the naval militia of the State of Rhode Island. Five complete outfits are now in store subject to the orders of the Bureau.

Some minor changes in the stowage of the articles of torpedo outfit suggested by Lieut. Marshall, by which a reduction of the space occupied by them is obtained, have been recommended to the Bureau, but have not yet been authorized.

The manufacture of detonators and fuses has been continued as required.

Electric vent-sealing primers have been made as needed for the service. A number of each of several experimental forms have also been made for trial at the naval ordnance proving grounds with a view to reducing the cost of manufacture while maintaining their efficiency. None, however, proved quite so satisfactory as the present authorized pattern.

A tank for the stowage of gun cotton in magazines on shore has been designed and submitted to the Bureau.

A new edition of the spar torpedo instructions has been published and issued.

TORPEDOES.

Working drawings and a description of an auto-mobile torpedo by Lieut. M. E. Hall, U. S. Navy, were submitted to and approved by the Bureau last autumn, and by direction of the Bureau the construction of a torpedo of this design was begun soon after. The patterns for castings have been made and all machine work for the torpedo has

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been done at this station. The sections of the shell of the torpedo were spun by Messrs. Phillips & Co., of Providence, R. I., from a special bronze submitted by them, specimens of which were tested under the Bureau's direction at the Washington navy-yard with satisfactory results. All the parts of the torpedo are now completed and ready for assembling except the flask or receiver for containing the compressed air. Up to the present time it has been impossible to obtain a suitable flask, the requirements in the matter of lightness combined with great strength being severe. These conditions having been met in an experimental cylinder of aluminum bronze, proportionate in diameter and thickness to the full size flask, an order was placed with the Aluminum Brass and Bronze Company of Bridgeport, Conn., in December, 1890, for the construction of a flask of the proper dimensions of cast and hammered aluminum bronze. The company has apparently endeavored to fulfill their agreement, but it has labored under the disadvantages of having no adequate plant for or experience in making castings of such large size in this metal. After making two defective castings the plant of the works was enlarged and a third attempt made. The casting in this case was apparently perfect, but upon cutting under the surface some small blow holes were discovered which led to its rejection by the company. Two other castings have since been made, but they have also proved defective.

To avoid further delay without annulling the order to the Aluminum Brass and Bronze Company, an order was placed in July last with the Carpenter Steel Company, of Reading, Pa., for rough-turned forgings for a steel flask. This company, which had already concluded a contract with the Department to supply forgings for the receivers of the Whitehead torpedoes now under construction in Brooklyn, accepted the order, but stated that before supplying the necessary forgings they preferred to have the first of the Whitehead receivers submitted to the required tests. It is hoped that the delivery of the flask will not be delayed much longer, but as this construction is as yet experimental in this country it is not at all certain when it will be received. The completion of the torpedo, after the receipt of the flask, will be a matter of a few weeks' work.

The experiments of the Hotchkiss Ordnance Company with the Howell torpedo, carried on at this station, were continued with indifferent success, until the winter season was so far advanced that work had to be suspended. Since that date, I am informed, the submersion mechanism of the torpedo has been greatly changed. Within the present month the new torpedo has been sent to the station. The company is now engaged in the preliminary experiments with the torpedo, in which they have such assistance from the officers of the station as they desire, but are not yet ready to submit it for the official trials.

After many preliminary experiments and much consideration of its requirements, Lieut. McLean and Lieut. Marshall have united in designing a naval defense mine, which has received the provisional approval of the Bureau, and which is now in process of construction. The design combines the elements of lightness, handiness, simplicity of parts, compactness of stowage, and adaptability to different needs in a remarkable degree.

The second and third of the Patrick torpedoes manufactured for the Department have had their preliminary trials and are now being prepared for their final speed trials.

It is recommended that the plant of this station be increased by the purchase of a Sims-Edison electric-controlled torpedo for the purpose of practice and instruction.

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CHEMICAL LABORATORY.

Owing to the increased facilities for analytical work in the chemical laboratory and to the expert assistance which the Bureau has wisely allowed the station to employ for the chemist, more interesting, important, and useful work has been accomplished within the past year than in any corresponding period in the history of the station. Analyses have been made of some forty-three specimens of steel, including samples from all armor plates used in the trials at Annapolis, five specimens of nickel ore, fifteen specimens of brown powder, thirty samples of smokeless powders, and eighty samples of acids, besides those of alkalies, alcohol, cotton waste, and other material used in manufacture. Numerous analyses have also been made of gun cotton and of the station smokeless powder in the process of manufacture. The total number of determinations in these analyses amount to sixteen hundred and forty-three. In addition to this an extended series of observations have been made upon methods for the determination of sulphur in steel and of nickel. The results of this work have been reported to the Bureau from time to time.

The use of calcium phosphide with torpedoes of the automobile type, for the purpose of determining their position at the end of a run or in case of their sinking, has made it necessary to anticipate a demand for this article. The earlier experiments with this substance having been made with material supplied by dealers in this country, advantage was taken of a recent fresh importation of phosphide, made in England especially for torpedo purposes, to make a comparison between this and the American article. The result has proved that the phosphide found in the American market is in no respect inferior to that produced in England. A series of experiments on a small scale has shown that the phosphide can be produced at the station in sufficient quantities for torpedo purposes at a considerably less cost than that at which it could be purchased. A small plant for its manufacture has been devised by the chemist, which embraces certain novel features, and which is now being constructed.

As in the previous year fulminate of mercury has been made in sufficient quantity to meet the needs of the service. Besides the filling of the detonator cases for service uses, more than two hundred detonating fuses of special forms have been manufactured.

The great increase of analytical work during the year has required the use of considerable quantities of quite expensive organic solvents. To reduce this expense as much as possible the wastes have been saved and an unskilled workman has been trained in the methods of recovering and purifying these solvents by fractional distillation. Besides this, a number of the chemical substances required in the work of the laboratory have been manufactured here from the raw materials. The resulting economy has been gratifying.

Among the researches that Prof. Monroe has in view is the most important one, a complete chemical study of the changes taking place in the nitrating and purifying processes in the manufacture of gun cotton, and of the relative value of the different fibers and acids offered in the market for use in the production of this substance.

A permanent gas supply for the laboratory is one of the needs of the station. At present gas is supplied compressed in flasks, and it is believed that economy would result from the erection of a small gas-making plant.

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Four shells filled with Emmensite, together with a number of cans containing this explosive, which were stored in the magazine on June 26, 1890, have been inspected monthly since that date. The plug in one of these shells became corroded a few months after the above date and was broken in the attempt to remove it. The plugs of the other three shells are removed at each inspection. So far no apparent change in the Emmensite has occurred in the three shells or in the cans containing the Emmensite. Considerable corrosion of the screw plugs has been observed.

Experiments have continued in firing this explosive as a charge for shells. The results of these experiments continue to show the insensitiveness of this substance to shock.

The extreme sensitiveness of fulminate of mercury is a cause of apprehension in the use of this substance as an initial explosive agent in the shells to be fired from powder guns. How well founded this apprehension may be is not a proper subject for discussion in this report. In any case an insensitive substance capable of initiating an explosion of a high order in Emmensite and other nitro-substitution products would be of great value. Hence a series of experiments have been made with various compositions and devices for exploding Emmensite in shell. As a result of these experiments a fuse mixture has been made which is insensitive to shock or percussion, and which explodes this substance with a high degree of certainty and with powerful effect when the Emmensite is in the granular condition.

The delayed-action detonating fuse, to which reference was made in my report of last year, and which, at that time, was to a certain extent discredited on account of a premature explosion of a shell, has been subjected to further experiment. Experience had shown that the shells then used, which were of thin cast iron, were full of imperfections and blow-holes. Another experimental shell has been made which is free from the defects of the old lot, and these shells, charged with the gun-cotton and fused with the delayed-action fuse, have been repeatedly fired with complete and uniform success.

The cocoa or brown powders, used in the service guns of high power have been the subject of extended examination, with most important and interesting results. It has been found that when exposed to comparatively low temperatures, such as might be met with in service storage, these powders undergo destructive distillation, through which a small though an appreciable amount of organic matter is volatilized. This matter has not yet been identified.

It having been stated in the report of the English inspectors of explosives for the year 1887 that brown and black powder can be detonated, experiments to determine this question have been made. It was found that with varying charges of mercury fulminate, an explosion of a very high order could be obtained with the German cocoa powder and with that manufactured in this country. That true detonation was not produced, however, was thoroughly demonstrated.

The fact that explosions of different orders can be produced in brown powders as well as in emmensite and other explosives by varying the methods of ignition as well as the character of the initial explosive, has an important bearing on the use of smokeless powders, particularly in small arms.

An examination of the Walsrode gun cotton, which has been experimented with in several European countries as a bursting charge for

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shells, shows it to be an ordinary gun cotton, superficially treated with acetic ether or some other solvent to produce a hard exterior surface. A similar preparation was made at this station some years ago.

The continued investigation of the methods of comparing the relative efficiencies of explosives has led to the rejection of Trauzl's method as being variable and unreliable. In order that the station may be prepared to test any explosive that may be offered, and with a view to a more thorough study of the explosives on hand, additions to the apparatus for making such tests will be added to the plant as the needs of the station may require.

With the introduction of nitro-substitution explosives, and especially when these are adopted for service use, it will become necessary to arrange such a plan of inspection as will insure obtaining a definite and uniform product. In anticipation of the event, methods for the analysis and testing of these quite complex organic substances have been the subject of study, and progress has been made in perfecting them.

GUN COTTON.

After considerable enlargement and improvement, the gun-cotton factory has been put into operation since the beginning of the fiscal year. It became necessary to shut it down again, after some 3,500 pounds of gun cotton had been made, on account of the extreme drought and the indifferent character of the water obtained from the Newport water main. There are on hand at this date 8,940 pounds of gun cotton of service pattern ready for issue, a sufficient quantity to meet all ordinary demands. There are besides 2,822 pounds of old patterns, a part of which will be reworked into the service blocks, and 612 pounds of service blocks returned from ships, or 12,374 pounds in all.

A very important research has been undertaken during the year, having for its object the study of the mixed acids that are used in large quantities in the manufacture of gun cotton. Heretofore the specifications under which the acids were purchased have indicated the qualities which the separate acids were to possess. As the acids were delivered mixed together, the verification of the original acids and their comparison with the specifications was impossible. As a result of the work already done, new specifications have been drawn and the acids now delivered are tested with the most satisfactory results.

A similar method of inspection has been instituted for the cotton waste and other materials used in the manufacture of gun cotton in order that the highest grade of material may be secured at the lowest possible cost.

The improved results obtained have justified the additional care and labor involved in the selection of the raw materials. While the tests have shown all the gun cotton in the course of manufacture to be within prescribed limits as regards stability and percentage of nitri-cotton present, that made before the water supply deteriorated in quality gave much better tests than any previous product of the factory on record.

The investigation of the materials for making gun cotton is being continued and extended with the expectation that acids well suited for the manufacture may be secured at even lower prices than the moderate ones that now obtain.

It is believed that the methods of laboratory inspection of gun cotton may be improved, and a number of observations have been made to this end, but the investigation is not yet completed.

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The purchase of finished gun cotton will necessitate a scheme of inspection somewhat different from that employed in connection with its manufacture. A plan for such inspection has been drawn up, and tests of the finished gun cotton produced here are being made so that the results may be used as a standard for reference.

Quarterly inspections are made of all gun cotton stored here and at Rose Island.

During the year there has been one reported case of supposed decomposition of gun cotton issued to the service. An examination showed not the least trace of decomposition, but, on the contrary, the results of the heat and solubility tests agreed surprisingly well with those made on a sample of the same factory charge as that to which the reported block belonged, drawn from the poacher in the process of manufacture.

The fact that the methods of examination of gun cotton on board vessels of war may lead inexperienced persons to erroneous conclusions, has suggested an attempt to provide an indicator that will show with certainty the neutral condition of the gun cotton. No great success has attended these efforts.

It may be well to reiterate, however, that in the several hundred examinations that have been made of gun cotton manufactured here and subjected to all the changes incident to service transportation and storage, no slightest sign of even incipient decomposition has ever been detected.

Gun cotton continues to be the most perfect existing explosive for naval uses. The safety of its manufacture, handling, and transportation, its compact stowage, its immunity from deterioration when stored for long periods, its insensitiveness to shocks and to explosion by ignition, and its equal effectiveness at very low temperatures are qualities which are combined in no other substance.

SMOKELESS POWDER.

By a printer's error in my report of last year it was made to appear that this station had contented itself with the examination and reproduction of foreign powders of the class known as "smokeless." This was far from being the case. Soon after I assumed charge of the station my attention was called by the honorable Secretary of the Navy and by the present Chief of the Bureau of Ordnance to the necessity then existing in the service for a smokeless powder that should at least equal the best of the foreign powders of this class. The subject was at once taken in hand, and at the date of the report above referred to encouraging progress had been made. It is with great gratification that since that time, through the labors and professional ability of Prof. Munroe, I have been enabled to present to the Bureau a powder which in all respects equals, and in many excels, the most successful of the foreign powders.

An interesting résumé of the reasoning and experiments which resulted in the invention of this powder was given in a report by Prof. Munroe in April last, a copy of which has been forwarded to the Bureau.

The qualities which, in addition to smokelessness, it has been sought to combine in this powder may be briefly stated as follows: First, progressive rate of burning, so that a high initial velocity of the projectile may be obtained without undue straining of the gun; second, uniformity, or in other words complete physical and chemical homogeneity, so that charges of equal weight will always produce the same ballistic effects under the same circumstances; and, third, permanency, that is, that

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the powder shall not deteriorate while stored or when subjected to considerable changes of temperature.

The first of these qualities, as appears from published reports, has been obtained in many of the foreign powders. Although they differ to some extent among themselves in the ballistic effects produced, it may be granted that a number of them give excellent velocities with quite moderate pressures. An examination of the powders, however, discloses a decided lack of homogeneity in many of them, so that it is not surprising that the results of firing equal charges show marked variations.

But it is in the quality of permanency that the foreign powders are deficient. They deteriorate, become sensitive, and develop unexpected pressures. The reason for this is not difficult of determination when the constitution of the powders is known. It is due to one or both of two causes; first, the use of substances which are unstable at all temperatures; and, second, the addition of a volatile constituent which, by its evaporation, changes the constitution of the powder.

The tests of the powder produced at this station have shown it to possess unusual ballistic qualities. A charge of 42 grains fired in a small caliber (0.301 inch) rifle imparts to a bullet weighing 215 grains a mean observed velocity, at 60 feet from the muzzle, of 2,100 feet per second, with a chamber pressure of about 12 tons to the square inch. The grade of powder adapted to the 3-pounder rapid-fire gun gave a muzzle velocity of 2,250 feet per second, with a chamber pressure of 14.8 tons. In the 6-pounder Hotchkiss gun a velocity of 1,920 feet per second was obtained with a chamber pressure of 14.3 tons. A grade of powder for the 4-inch and 5-inch guns has been manufactured, but has not yet been tried.

The concordance of the results obtained with the powder by different experimenters at widely separated points and with independent apparatus has been remarkable. In one case only do the results reported with it differ materially from those reported by other observers, and in this case it can be shown that the anomalous results were due to imperfect methods of experiment. In a previous portion of this report reference has been made to the different character which the explosion of various explosive substances may assume, according to the method by which the explosion is produced and the nature of the initial explosive agent. The smokeless powder is not an exception to this general rule.

Uniformity is secured by the method of manufacture which is such as to give a homogeneous product. Microscopic and chemical examinations of the substance at different stages of the manufacture disclose no variation in different portions of the material. The finished powder is a dense, hard mass, not friable, and entirely structureless.

The endeavor has been to obtain in this powder a substance which will be permanent under all circumstances. To this end the materials used in the manufacture are carefully purified. The finished powder contains no unstable nor any volatile constituent, and it is reasonable assumption that it will itself be stable, though this feature can only be determined by experience. Repeated heating for prolonged periods has no apparent effect upon it. Although it will not burn when wet, it is not permanently affected by water, even by boiling in water. A sample has been subjected to the action of a mixture of ether and alcohol for five weeks without change, though this solvent will break down in a short time all other smokeless powders examined here. Repeated efforts to detonate it with fulminate of mercury have been un-

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successful, even when closely confined in stout wrought-iron cylinders. It is not detonated by influence, a charge of 65 grains of the powder contained in a copper case and placed 0.79″ (2 cm) from a block of gun cotton weighing 100 grams (over one-fifth of a pound), being simply scattered when the gun cotton was detonated by 35 grains of mercury fulminate. These latter experiments constitute a much more severe test than any to which the foreign powders of this class have been subjected so far as appears in the literature of the subject. A résumé of them is submitted as an appendix to this report.

The machinery for the manufacture of the powder has all been devised at the station. The machines are all novel except the incorporating mill which has been adapted from a tool found in the market.

ELECTRICAL LABORATORY.

In the electrical laboratory continued experiments have been made with a view to developing a satisfactory apparatus for signaling ranges from the conning tower to the gun positions. The experimental apparatus for this purpose, arranged at the station and set up on board the *Yorktown*, has not been reported upon, but it is understood that it has not been entirely satisfactory. This result is due in part to defective installation, and also to the unsuitability of portions of the apparatus to the service on board ship.

The usual duties in connection with the maintenance and use of the electric light plant for lighting the buildings, grounds, and wharves, and the inspection of wires, cables, fuses, and other electrical appliances have been performed.

An electric chronograph for measuring the velocities of projectiles in small calibers and with smokeless powder has been installed in the laboratory.

The gun-cotton factory has been wired for electric lighting in the dark afternoons of winter. The wiring was done by the seamen under instruction, as has all the electrical repairing work, the care of the dynamos and the dynamo engines.

Lieut. McLean, in addition to his duties as electrician and instructor in electricity, has devoted much time to the development of a naval mine and to torpedo work generally. He has made a visit to the works of the Whitehead Torpedo Company at Fiume during the year and has also been the Bureau's inspector of the work in progress on the Whitehead torpedoes, building for the Department.

The chronographic records of chronometer comparisons with the time signals transmitted daily over the wires of the Western Union Telegraph Company from the Naval Observatory at Washington, have been continued during the year, and reported monthly to the observatory for use in determining the corrections of the signals. The time ball has been dropped at noon of standard time (seventy-fifth meridian) with great regularity.

INSTRUCTION.

During the year the course prescribed for seamen under instruction has been carefully carried out.

Thirty-two seamen have qualified as seamen gunners, 3 have been transferred to the general service on account of unsatisfactory conduct and 1 for inaptitude. One was discharged at the expiration of his enlistment, but after a month's absence reënlisted and returned to the station to complete his course.

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The average number of seamen under instruction has been 21. There are at present 29 at the station.

The distribution of time for instruction in the different branches is the same as last year.

The exercises of the seamen in diving have been made useful as well as instructive. They have laid the launching ways for the Patrick torpedo and made an examination of the city sewer laid across the harbor. Their interest in the work has been excited and stimulated by the discovery, in 10 fathoms of water west of the station, of a sunken wreck which has been under examination for several weeks. Many interesting articles have been recovered from the wreck, including 3 small guns of cast iron of an ancient type. Advantage has been taken of this wreck to give instruction in placing torpedoes for blowing out different portions. An old steam pump is at present being repaired with which some hydraulic excavating will be done.

With some exceptions the character of the men sent here for instruction is excellent, and the advantage to the service of their training here must be very great.

LIBRARY.

During the year 642 volumes have been added to the library, making the total number 3,238. The card catalogue has been increased by 749 cards, the total number being now 3,414. Small additions have been made to the topical catalogue of periodicals.

The policy of completing sets of periodicals on professional subjects by exchange and purchase has been steadily kept in view.

SANITARY CONDITION.

The sanitary condition of the station is good and the general health of the officers, enlisted men, and employés has been excellent. It is hoped, however, that improved quarters for the men may be obtained before winter sets in by attaching to the station a vessel on which they may be berthed.

Very respectfully,

THEO. F. JEWELL,
Commander, U. S. Navy,
Inspector of Ordnance in charge of Station.

The CHIEF OF BUREAU OF ORDNANCE,
Navy Department, Washington, D. C.

REPORT OF THE INSPECTOR OF SEAMEN, ORDNANCE OFFICE, WASHINGTON NAVY-YARD.

ORDNANCE OFFICE, U. S. NAVY-YARD,
Washington, D. C., October 15, 1891.

SIR: I have the honor to submit for transmittal to the Chief of Bureau of Ordnance the following report as to the instruction of seamen during the past year:

The object sought has been to familiarize them with ordnance materials of modern type and to impart such information as is essential to the proper care and manipulation of the same; to instruct them as

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far as practicable, within the time allowed, in such branches of mechanical work as will best enable them to make repairs, to understand the cause of and overcome difficulties liable to be encountered, that they may become a well trained and skilled class of petty officers.

The course extends over six months and is subdivided into the following branches: (1) General machine work. (2) General ordnance. (3) Forge and foundry. (4) Coppersmithing. (5) Carpentry.

The men are sent here singly or in small numbers at odd times so that there is a continual change by exit and entry, which has some advantages.

It prevents the overcrowding of the shops by these men and a consequent hindrance to work and annoyance of workmen employed. The seamen have been detailed to various shops in numbers proportionate to the total here under instruction. If the men were sent here in classes, at intervals of six months, the above could not be carried out, maintaining the progressive character of the instruction.

Each week when the men were detailed they were given a subject connected with the work going on in the shop to which they were assigned to familiarize themselves with and a task to make. The following week they were examined on those subjects and their work overhauled. This, combined with a supervision of their industry and attention to duty in the shops, kept them steadily at work.

The details of the course in the several branches were as follows and in the order given:

Carpentry (one week): Use of wood machines, hand tools, and work in the shop. Tasks—ax handles, stock for shoulder rifle, patterns of various kinds, dovetailing, etc.

Coppersmithing (one week): Construction of powder cylinders, bending pipes, tinning, wiping joints, brazing, soldering, etc. Tasks—oil cans, brazing, wiping joint, etc.

Forge (first week): Building fire in forge, plain forging and welding. Tasks—bolts, nuts, welding, improvised cranks for Gatling, etc.

Second week: Tempering—annealing and dressing tools, case hardening, manufacture of gun shields. Task—lathe tools.

Foundry (one week): Construction of furnaces, molding, casting, and cleaning castings. Task—make mold and core, cast shell, composition crank for Gatling.

General machine works (twelve weeks):

First week: Hydraulic press, testing carriage cylinders, banding shell, pressing gas-check pads, the operation and use of all machines and tools used in the machine shop.

Second week: Testing, turning, and inspection of shell, armor-piercing shell and shrapnel.

Third week: Mounts for mahine and rapid-fire guns.

Fourth week: Construction of B. L. R. carriages and value of all working parts.

Fifth week: Construction of B. L. R. and the conversion of 11-inch S. B. to 8-inch M. L. R.

Sixth week: Construction and operation of breech mechanism of B. L. R.

Seventh week: Method of sighting guns, sights and their use, star-gauge and gauging.

Eighth week: Construction and operation of the breech mechanism of the Hotchkiss, Driggs-Schroeder, and Dashiell rapid-fire guns.

Ninth week: Ten-inch mount for turrets.

Tenth week: Twelve-inch mount for turrets.

Eleventh week: General review of first five weeks' course in machine shop.

Twelfth week: General review of second five weeks in machine shop.

Tasks in machine shop: Making and repairing all minor parts of shoulder rifle, same with revolver combination, lock-butt, open-end and closed-end wrenches, linch-pin, Gatling firing pin and extractor, washer and pin for field carriage, sears for spring lock, tray latch, back latch, bolt and nut, set of chisels, soldering iron, screw driver, machinist's hammer, set of screws, priming wires, boring bits, models of new guns made from scale drawings, scale $\frac{1}{6}$, etc.

General ordnance (nine weeks):

First week: Laboratory—construction, operation, and action of all fuses used in the service. Task, witnessing all work in connection with the manufacture of fuses.

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Second week: Laboratory—construction and action of all classes of primers, signals, rockets, lights, slow match, quick match, reloading small-arm and rapid-fire ammunition, method of, etc. Task—reloading small-arm ammunition.

Third week: Museum—small-arms and Gatlings nomenclature; operation and value of all working parts. Task—dismounting and reassembling.

Fourth week: Museum—Hotchkiss guns; operation of their mechanism and value of all working parts. Task—dismounting and reassembling.

Fifth week: Shell house—preparation of projectiles for service, weights of same, and bursting charges, cutting, making, and marking cartridge bags, gun gear and use of, dismounting gear and use of, securing gear and use of, all leather equipments. Task—assist gunners, gauge, and witness all work.

Sixth week: Shell house—slinging, stowing, and skidding guns; preparation of guns for transportation; preservation of guns and projectiles in parks; construction of magazines ashore and afloat (new and old type); care of same; handling and stowing powder and projectiles; filling cartridge bags; deterioration of powder; examination of bores and vents. Task—assisting gunner's gang, taking vent and bore impressions.

Seventh week: Museum—gunners' duties, records, reports, etc. Task—keep a set of books; make out an allowance for ship.

Eighth week: General review of laboratory work and gunners' duties.

Ninth week: General review of shell house, small arms, Gatlings and Hotchkiss guns.

In the above course a thorough knowledge of details and of their practical working in the service was required.

The weekly examinations were thorough and searching.

Weekly records have been kept, consisting of a list of the men, where they were detailed, the subject and tasks assigned, the results of examinations, the conduct, intelligence, and aptitude for the service of each man.

On completion of his course each man was given a rigid oral examination, covering the entire field of his work and its practical application to his possible future duties aboard ship. This was done except in one instance, when owing to an unusual number having entered at one time, in August, 1890, and consequently finishing the same week, it was found expedient to give them a written examination. The papers handed in by those men were very accurate and reflected credit on their intelligence and industry whilst on duty here.

During the year ending September 30, 1891, 87 men have been under instruction here; 55 have qualified, 1 failed to qualify, 7 have been ordered to other stations before the completion of their course (their record whilst here not being good), and 1 was discharged from the service at his own request.

The majority of those who qualified did so with great credit, and displayed on their final examination evidences of careful attention to work and the acquirement of professional and mechanical knowledge that will make them most useful men in the service. A number would undoubtedly make excellent gunners.

There being no revolving cannon or rapid-fire guns for the use of the men, instruction in them was mostly from books and drawings. This also prevented any exercise in firing them.

I respectfully recommend that a rapid-fire gun and its mount be supplied them, that they may become skilled in its use and have the practical exercise of reloading its ammunition.

A weekly system of target firing with shoulder rifle and the new revolver has been carried on with most excellent results. The majority became good marksmen, with the shoulder rifle, at 100, 200, 300, and 500 yard ranges.

It would unquestionably be of great benefit to the men if they could spend at least one week at the proving ground, where they could wit-

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ness the actual service of the guns and working of the mounts; this could be done without lengthening the course, by reducing the time given to review.

Very respectfully, your obedient servant,

CHARLES O'NEIL,
Commander, U. S. Navy, Inspector of Ordnance.

Commodore J. S. SKERRETT, U. S. Navy,
Commandant Navy-Yard, Washington, D. C.

REPORT OF THE BOARD ON ARMOR TESTS.

UNITED STATES NAVAL ORDNANCE PROVING GROUND,
Indian Head, Maryland, November 28, 1891.

SIR: The Board convened by the Department's order of the 29th of September last, to carry out a competitive test of certain armor plates, having completed the trial of six plates, in obedience to the Department's order of the 20th instant, has the honor to report to you as follows:

The firing took place on October 31 and November 14, and on each of these days three plates were tested.

The size of each plate was 8 feet by 6 feet by 10.5 inches, and it was fastened to the backing by twelve bolts 2.36 inches in diameter, giving a total bolt cross section of 52.29 square inches. Further details are—

Character of plate.	Maker.	Weight.	Total bolt cross section per ton of plate.
		Pounds.	*Sq. inches.*
High-carbon nickel-steel	Bethlehem Iron Company	20,494	5.71
Low-carbon nickel-steel	Carnegie, Phipps & Co.	20,844	5.63
Low-carbon steel, Harvey	Bethlehem Iron Company	20,506	5.71
High-carbon nickel-steel	Carnegie, Phipps & Co.	20,590	5.69
Low-carbon nickel-steel, Harvey	do	20,220	5.79
High-carbon nickel-steel, Harvey	Bethlehem Iron Company	20,682	5.66

The targets were set up so that the faces of the plate were on the chords of a circle whose center was the gun's pivot and whose radius was 73 feet 5 inches. The muzzle of the 6-inch B. L. R. was consequently 57.5 feet and the 8-inch B. L. R. 55.5 feet from the face of the plate when the gun was pointed at its center, the axis of the gun being then perpendicular to the plane of the plate.

The backing was constructed in accordance with the drawings furnished by the Bureau of Ordnance, a copy of which is annexed and marked No. 1, except that, on account of the length of the armor bolts, on the first day wooden and on the second iron washers were used under the cup washers of these bolts. During the first day's firing some of the wooden washers were split and somewhat compressed and the armor-plate bolt nuts were in some cases tightened between the shots.

The surfaces of the plates were as they came from the makers and were free from paint.

The armor bolts used were made and fitted in accordance with the drawing annexed and marked No. 2.

The gun was mounted on a solid platform and protected overhead by a shed of heavy timbers, and in front by a bank of earth, with sand bags around the chase.

The guns were served by the men of the Naval Ordnance Proving Ground, under the direction of Ensign Dashiell, were pointed by means of cross-hair sights in the bore, and were fired by friction primers with a long lanyard leading to the bomb-proof near the gun, 18 feet distant.

Ample protection for all present was provided by convenient bomb-proofs, and all needful precautions against accident were observed.

In this report "front," when applied to the plate or to fragments thrown therefrom, will mean the direction from the plate towards the gun. The swellings of the plate caused by the projectile will be called the "front bulge" and the "back bulge." "Right" and "left" will be taken as the right or left hand of a person facing the front of the plate. "Perforation" will indicate that the hole through the

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plate is in its entire length, as great or greater than the maximum diameter of the projectile.

The firing programme was as follows:

(1) Four shots from a 6-inch B. L. R. at the corners of each plate, in the following order, viz:
- Left upper corner of each plate.
- Right upper corner of each plate.
- Left lower corner of each plate.
- Right lower corner of each plate.

(2) One shot from an 8-inch B. L. R. at the center of each plate.

Photographs were taken as follows:
- Of the group of plates before firing.
- Of each plate before firing.
- Of each plate after each shot at it.
- Of the group after the 6-inch firing.
- Of the group after the 8-inch firing.
- Of the back of each plate, normal view.
- Of the back of each plate, angular view.
- Of the front of each backing.

BALLISTIC DETAILS.

6-inch B. L. R.

Gun.—6 inch B. L. R. of 40 calibers; Mark III. No. 120.

Charge.—42.4 pounds Du Pont's brown prismatic powder.

Projectile.—6-inch armor-piercing shell, manufactured by Jacob Holtzer & Co., Unieux, France, brought up to the standard weight of 100 pounds by filling with sand and small fragments of iron.

Striking velocity, determined by previous firings	foot-seconds..	2,075
Striking energy	foot-tons..	2,989
Striking energy per ton of plate, about	do....	325
Elevation for upper corners		+1° 44′
Elevation of lower corners		—1° 24′

Carriage.—Central pivot, Mark IV. No. 93.

8-inch B. L. R.

Gun.—8-inch B. L. R. of 35 calibers, Mark III. No. 18.

Charge.—74.5 pounds Du Pont's brown prismatic powder.

Projectile.—8-inch Firminy armor-piercing shell, manufactured by T. Firth & Sons, Sheffield, England, brought up to the standard weight of 210 pounds by filling with sand and small fragments of iron.

Striking velocity, determined by previous firings	foot-seconds..	1,850
Striking energy	foot-tons..	4,989
Striking energy per ton of plate, about	do....	543

When the Carpenter projectile was used:

Charge.—72.5 pounds Du Pont's brown prismatic powder.

Projectile.—8-inch armor-piercing shell, manufactured by the Carpenter Steel Company, Reading, Pa., brought up to the standard weight of 250 pounds by filling with sand and small fragments of iron.

Striking velocity	foot-seconds..	1,700
Striking energy	foot-tons..	5,008
Striking energy per ton of plate, about	do....	545

Carriage.—Central pivot, Mark IV. No. 15.

The total striking energy of the five projectiles was 16,940 foot-tons, equal to about 1,845 foot-tons per ton of plate.

FIRST DAY, OCTOBER 31, 1891.

Weather clear; therm. at 9 a. m., 52° F.; at 2 p. m., 70° F.

Round 1.

First shot at Bethlehem Iron Company's high-carbon nickel-steel plate. Time, 8:48:45 a. m.

Gun.—6-inch B. L. R.

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The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered the plate and rebounded to the front 31 feet 10 inches, and ricocheted 19 feet 2 inches beyond. The projectile was unbroken, and was shortened 0.06; expanded at bourrelet 0.01, at body 0.03, at base 0.00.

The penetration of the point was 13.25 inches.

A bulge was formed on the face of the plate 16.5 inches in diameter, with a regular and curling fringe of metal about the hole 1.75 inch high, and radial hair cracks in the bulge 4.5 inches and 2.5 inches long.

The bulge on the back of the plate was 16.5 inches in diameter, about the hole 1.75 inches wide; opposite the point of the projectile, from which a star of cracks opened out. A piece of metal about one-third the bulge was scaled off the back of the plate.

The indent in the backing corresponded in shape to the back bulge and was 11 inches in diameter and 1.75 inches deep.

The head of one of the side plate bolts was broken.

(See photographs Nos. 2, 5, 22, 23, 24.)

Round 3.

First shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel plate. Time, 8:56 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered and remained in the plate apparently intact, with its base 9.75 inches inside the face of the plate.

The estimated penetration of the point was 26.53 inches.

A bulge was formed on the face of the plate 18.5 inches in diameter, with a regular and curling fringe of metal about the hole 1.75 inch high.

No cracks.

When the plate was removed from the backing the projectile remained in the latter, with its base 1.5 inch from the normal surface thereof.

The bulge on the back of the plate was 16.5 inches in diameter, and 4.87 inch high about the hole through which the projectile passed.

The indent in the backing corresponded in shape to the bulge, and was 11 inches in diameter and 4 inches deep. Two small pieces of the plate adhered to the backing. One of the side plate bolts was loosened.

(See photographs Nos. 2, 5, 22, 23, 24.)

Round 3.

First shot at Bethlehem Iron Company's low-carbon steel Harvey plate. Time, 9:9:50 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered and broke up; the head split into twelve pieces with a very jagged fracture and remained in the plate, and the base was broken into small pieces, one of the larger of which being found about 100 yards to the front. The front end of the charge chamber was 2.75 inches inside the face of the plate.

The estimated penetration of the point was 10.07 inches.

A bulge was formed on the face of the plate 19 inches in diameter, with a maximum height about the hole of 0.75 inch. There was no curling fringe, but the metal about the hole chipped off.

The bulge on the back of the plate was 16 inches in diameter and 2 inches high, with a star of cracks opening from the point of the projectile.

The backing showed a slight depression, corresponding in shape to the bulge, 12 inches in diameter and 1.5 inch deep.

Two of the side-plate bolts were loosened.

(See photographs Nos. 4, 7, 28, 29, 30.)

Round 4.

Second shot at Bethlehem Iron Company's high-carbon nickel-steel plate. Time, 9:20:28 a. m.

Gun.—6-inch B. L. R.

The point of impact was 22.5 inches from the top and 24 inches from the right side of the plate.

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The projectile entered and broke into several pieces, the head with a jagged fracture and split into three equal pieces remaining in the plate. The front end of the chamber was 2.75 inches inside the face of the plate.

The estimated penetration of the point was 10.07 inches.

A bulge was formed on the face of the plate 18.5 inches in diameter with a regular and curling fringe about the hole 1.75 inch high. Three short surface radial cracks were developed in the bulge, 2 inches, 2.5 inches, and 2.75 inches long.

The bulge on the back of the plate was 17 inches in diameter, and 2.12 inches high; about the hole 1 inch wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 11 inches in diameter and 1.37 inch deep.

One of the side plate bolts was loosened. The top of the plate was separated from the backing 0.5 inch.

(See photographs Nos. 8, 22, 23, 24.)

Round 5.

Second shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel plate. Time, 9:31:45 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the right side of the plate.

The projectile entered and remained in the plate, broken into two pieces, with its base 9 inches beyond the surface of the plate.

The estimated penetration of the point was 26.32 inches.

A bulge was formed on the face of the plate 18.75 inches in diameter, with a regular and curling fringe about the hole 1.75 inch high.

No cracks.

When the plate was removed from the backing the projectile was found broken at the rotation band, the head sticking in the backing and the base in the plate.

The bulge in the back of the plate was 17 inches in diameter and 4.5 inches high.

The indent in the backing corresponded in shape to the back bulge; was 11 inches in diameter and 4 inches deep. Two small fragments of the plate adhered to the backing.

The upper part of the plate was sprung away from the backing 0.5 inch.

(See photographs Nos. 9, 25, 26, 27.)

Round 6.

Second shot at Bethlehem Iron Company's low-carbon steel Harvey plate. Time, 9:41:20 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the right side of the plate.

The projectile entered and broke up, the head with a very jagged fracture remained in the plate. The body of the shell broke into many fragments. The front end of the charge chamber was 2.37 inches inside the face of the plate.

The estimated penetration of the point was 9.7 inches.

A bulge was formed on the face of the plate 18 inches in diameter with a maximum height about the hole of 1 inch. There was no curling fringe, but the metal about the hole was chipped off. A crack probed 5 inches deep, but was probably through and extended from the hole to the right side of the plate 18.37 inches from the top.

The bulge on the back of the plate was 18 inches in diameter and 1.62 inch high with a star of cracks opening out from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 1 inch deep.

Several of the side plate bolts were started and loosened and the upper left corner of the plate was sprung away from the backing 0.25 inch.

(See photographs Nos. 10, 28, 29, 30.)

Round 7.

Third shot at Bethlehem Iron Company's high-carbon nickel-steel plate. Time, 9.53:20 a. m.

Gun.—6 inch B. L. R.

The point of the impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered and rebounded unbroken to the front 15 feet, ricocheted

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10 feet 6 inches farther, striking an oak timber and rebounded 7 feet. It was shortened 0.06 inch, expanded at bourrelet 0.02 inch, at body 0.035 inch, at base 0.0 inch.

The penetration of the point was 12.75 inches.

A bulge was formed on the face of the plate 16.75 inches in diameter, with a regular and curling fringe 1.75 inch high around the hole, with three radial hair cracks in the bulge, each 3 inches long.

The bulge on the back of the plate was 15 inches in diameter and 2.75 inches high, about the hole 0.5 inch wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge, and was 11 inches in diameter and 2 inches deep.

Several bolts of the side plates were started and loosened.

The top of the plate was sprung away from the backing 0.75 inch.

(See photographs Nos. 11, 22, 23, 24.)

Round 8.

Third shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel plate. Time, 10:2:32 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered and remained in the plate apparently intact. The base plug could be turned while the projectile was warm, but when cold was set fast. The base of the projectile projected 2.69 inches from the face of the plate.

The estimated penetration of the point was 14.6 inches.

A bulge was formed on the face of the plate 16.5 inches in diameter, with a regular and curling fringe about the hole 1.44 inch high.

No cracks.

The bulge on the back of the plate was 17 inches in diameter and 4.25 inches high, about the hole 2 inches wide which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 11 inches in diameter and 2.75 inches deep.

The top of the plate was sprung 0.75 inch away from the backing.

(See photographs Nos. 12, 25, 26, 27.)

Round 9.

Third shot at Bethlehem Iron Company's low-carbon steel Harvey plate. Time, 10:10:45 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered and remained apparently intact in the plate, the base 9.68 inches inside the face.

The estimated penetration of the point was 26.96 inches.

A bulge was formed on the face of the plate 16.25 inches in diameter, with a fringe about the hole 1.3 inches high, part of which was chipped off, and numerous radial hair cracks in the bulge not over 3 inches long.

The bulge on the back of the plate was 18 inches in diameter and 3.5 inches high about the hole through which the projectile had passed.

A crack extended from the hole to the bottom of the plate 24 inches from the left side, which probed 2.37 inches deep. The crack noted in No. 2 shot on this plate opened slightly and a surface crack developed upwards from No. 2 hole towards the top of the plate.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 2.5 inches deep. The projectile remained in the backing, its base projecting 1.5 inch from the surface.

The lugs of the wrought-iron clamp which held the bottom of the side plates were bent outwards and the right one cracked, showing that the side plates had been forced outward at the moment of firing.

(See photographs Nos. 13, 28, 29, 30.)

Round 10.

Fourth shot at Bethlehem Iron Company's high-carbon nickel-steel plate Time, 10:18:52 a m.

Gun.—6-inch B. L. R.

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The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The projectile entered, broke into several pieces and rebounded, the head being found 21 feet to the front.

The penetration of the point was 10.37 inches.

A bulge was formed on the face of the plate 17.25 inches in diameter, with a regular and curling fringe about the hole 1.87 inches high, and two radial hair cracks in the bulge 3 and 4 inches long.

The bulge on the back of the plate was 15 inches in diameter and 1.62 inch high, with a slight crack from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 10 inches in diameter and 1 inch deep.

The side plate bolts were started and the upper part of the plate was 0.75 inch away from the backing.

(See photographs Nos. 14, 17, 22, 23, 24.)

Round 11.

Fourth shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel plate. Time, 10:26:55 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The projectile entered, broke into several pieces, and rebounded, the head and a portion of the body in one piece being found 29 feet 6 inches to the front and 25 feet to the right. The head parted from the body at the bourrelet for about 300 degrees with a single piece of the body about 4 inches long adhering thereto.

The penetration of the point was 13.19 inch.

A bulge was formed on the face of the plate 17.5 inches in diameter, with a regular and curling fringe about the hole 1.75 inches high.

No cracks.

The bulge on the back of the plate was 18 inches in diameter and 2.87 inches high about the hole 2 inches wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 11 inches in diameter and 2.5 inches deep, with a small fragment of the plate sticking therein. The course of backing next to the plate was split between No. 3 and No. 4 hole.

(See photographs Nos. 15, 17, 25, 26, 27.)

Round 12.

Fourth shot at Bethlehem Iron Company's low-carbon steel Harvey plate. Time, 10:37:50 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The projectile entered and remained in the plate very much set up, the base projecting 6.37 inches from the face of the plate. The projectile near the bourrelet was expanded 1 inch, and there were two longitudinal cracks in the body; the base plug could be easily turned.

The estimated penetration of the point was 10 inches.

A bulge was formed on the face of the plate 16.25 inches in diameter and 1.5 inch high, much of the metal about the hole being chipped off.

A crack extended from No. 3 hole to the bottom of the plate 3.75 inches from the right side, which probed from 3 to 4.5 inches deep. A second crack extended from No. 4 hole vertically downwards and joined the last. Small surface cracks 15 inches long developed from hole No. 3.

The bulge on the back of the plate was 16 inches in diameter and 2 inches high, with a star of cracks opening out from the point of the projectile.

The indent of the backing corresponded in shape to the back bulge, and was 12 inches in diameter and 1 inch deep.

(See photographs Nos. 16, 17, 28, 29, 30.)

Round 13.

Fifth shot at Bethlehem Iron Company's high-carbon nickel-steel plate. Time, 1:27 p. m.

Gun.—8-inch B. L. R.

Projectile.—Firminy armor piercing shell of 210 pounds. The point of impact was

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the center of the plate. The projectile entered the plate and rebounded apparently intact 25 feet to the front, struck an oak timber, thence ricocheted 29 feet farther striking bank and rebounded 8 feet. It was shortened 0.12 inch, expanded at bourrelet 0.00 inch, at body 0.06 inch, at base 0.01 inch.

The penetration of the point of the projectile was 16.5 inches.

A bulge was formed on the face of the plate 20.75 inches in diameter, with a regular and curling fringe around hole 2.12 inches high. A wide crack radiated from this by No. 1 hole to the top of the plate 12.25 inches from the left side, another through No. 3 hole to the bottom of the plate 10.12 inches from its left side, and another to No. 2 hole, all of which extended through the plate.

The bulge on the back of the plate was 22 inches in diameter and 5.5 inches high about the ragged hole 4.5 inches wide, made by the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 15 inches in diameter and 4 inches deep, with the imprint of the point of the projectile sharply defined, 5.62 inches deep.

The entire target structure was set back about an inch, the bolts of the side plates loosened and one of the backing bolts set back 4.5 inches. The top of the plate was sprung away from the backing 0.87 inch.

When the plate was removed from the backing it held together and all the armor bolts but three were easily unscrewed.

(See photographs Nos. 18, 21, 22, 23, 24.)

Round 14.

Fifth shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel plate. Time, 1:38:20 p. m.

Gun.—8-inch B. L. R.

Projectile.—Firminy armor piercing shell of 210 pounds.

The point of impact was the center of the plate.

The projectile entered and remained in the plate apparently intact, with its base 0.87 inch inside the face of the plate.

The estimated penetration of the point was 22.06 inches.

A bulge was formed on the face of the plate 21 inches in diameter, with a regular and curling fringe about the hole 1.87 inch high.

A through crack extended from this to No. 1 hole and thence to the top of the plate 10.5 inches from the left side.

The back of the plate showed in addition a through crack from No. 5 through No. 4 hole to the bottom of the plate, and a very fine crack, not through, from No. 5 through No. 2 hole to the upper edge of the plate 11 inches from the right corner.

The bulge on the back of the plate was 24 inches in diameter and 6.5 inches high about the projectile.

The indent in the backing corresponded in shape to the back bulge, was 14 inches in diameter, and the imprint of the point of the projectile was 10.75 inches deep.

Five of the backing and one of the armor bolts were started.

When the plate was removed from the backing it held together and all the armor bolts but two were easily unscrewed.

(See photographs Nos. 19, 21, 25, 26, 27.)

Round 15.

Fifth shot at Bethlehem Iron Company's low-carbon steel Harvey plate. Time, 1:46 P. M.

Gun.—8-inch B. L. R.

Projectile.—Firminy armor piercing shell of 210 pounds.

The point of impact was the center of the plate.

The projectile perforated the plate and remained, apparently intact, in the backing, the base 22.25 inches inside the face of the plate.

The estimated penetration of the point was 43.48 inches.

A bulge was formed on the face of the plate 22.5 inches in diameter and 1.25 inch high; the metal about the hole was chipped off.

A through crack reached from No. 2 to No. 3, passing through No. 5 hole, and all the previous cracks widened and some were much extended.

The bulge on the back of the plate was 24 inches in diameter and 8.37 inches about the hole through which the projectile had passed. The back of the plate showed, in addition, the following cracks which extended partly through the plate: One from No. 5 to No. 4 hole, and three from No. 1 hole, the first to the top of the plate, 13.5 inches from the left side; the second to the left side, 10 inches from the top; and the third to No. 5 hole.

The imprint in the backing corresponded in shape to the back bulge, and was 15 inches in diameter. The projectile remained in the backing.

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The backing was split and broken through in wake of the shot. The side plates were started away 1 inch at the top, and several of the backing bolts were driven back.

When the plate was removed from the backing it held together, and ten of the armor-plate bolts could not be unscrewed.

(See photographs Nos. 20, 21, 28, 29, 30.)

SECOND DAY, NOVEMBER 14, 1891.

Weather clear. Thermometer at 9 a. m. 49° F.; at 1 p. m. 69° F.

Round 1.

First shot at Carnegie, Phipps & Co.'s high-carbon nickle-steel plate. Time, 9:8:30 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered and rebounded 46 feet 6 inches to the front, burying itself in the sand. A circumferential hair crack was found near the bourrelet and the projectile was shortened 0.1 inch and expanded at bourrelet 0.0 inch, at body 0.04 inch, at base 0.0 inch.

The penetration of the point of the projectile was 12.5 inches.

A bulge was formed on the face of the plate 18.5 inches in diameter, with a chipped fringe 2 inches high about the shot hole, and a number of radial hair cracks in bulge not exceeding 3 inches long.

The bulge on the back of the plate was 14.5 inches in diameter and 3.56 inches high about the hole, 2.5 inches wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 13 inches in diameter and 2.62 inches deep.

Two of the side plate bolts were started.

(See photographs Nos. 2, 5, 22, 23, 24.)

Round 2.

First shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel Harvey plate. Time, 9:18:20 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered and remained apparently intact in the plate, the base projecting 2.62 inches from the face of the plate, the axis slightly inclined from the normal. A very small piece was found broken off from the extreme point of the projectile and two flakes were started from the head, halfway between the point and the bourrelet, adhering firmly at their rear ends.

The penetration of the projectile was 14.6 inches, the axis slightly inclined to the normal.

A bulge was formed on the face of the plate 18 inches in diameter, with a chipped fringe about the projectile 2.37 inches high, and a number of radial hair cracks in the bulge not over 4 inches long.

The bulge on the back of the plate was 21.5 inches in diameter and 4.12 inches high, with a star of cracks opening from the hole 5.5 inches wide through which the point of the projectile had passed.

The indent in the backing was jagged, 4 inches deep at center and 14 inches in diameter. A small fragment of the plate adhered thereto.

One of the side plate bolts was started.

(See photographs Nos. 3, 6, 25, 26, and 27.)

Round 3.

First shot at Bethlehem Iron Company's high-carbon nickel-steel Harvey plate. Time, 9:26:56 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the left side of the plate.

The projectile entered the plate, broke into three pieces, and rebounded, the largest piece being found 45 feet to the front and 10 feet 6 inches to the right. One piece was the point 3 inches long, another, longitudinal, extending from the base 7

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inches and 5 inches wide; the remaining piece was somewhat cracked. The projectile was expanded at bourrelet 0.03 inch.

The penetration of the point was 12 inches.

A bulge was formed on the face of the plate 18.25 inches in diameter with a chipped fringe about the hole 1.12 inch high, and a number of radial hair cracks in the bulge not over 5 inches long.

The bulge on the back of the plate was 21 inches in diameter and 2.25 inches high about the hole 0.25 inch wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 1.5 inch deep.

The head of one of the side plate bolts was broken and two others loosened.

(See photographs Nos. 4, 7, 28, 29, 30.)

Round 4.

Second shot at Carnegie, Phipps & Co.'s high-carbon nickel-steel plate. Time, 9:38 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the right side of the plate.

The projectile entered the plate, broke into many small pieces and rebounded. The head about 10 inches long was recovered, fracture jagged and parallel to the bourrelet.

The penetration of the point was 10.75 inches.

A bulge was formed on the face of the plate 19.75 inches in diameter with a curling fringe, partly chipped off about the hole 1.56 inch high, and a few radial hair cracks in the bulge not over 3 inches long.

The bulge on the back of the plate was 15 inches in diameter, and 1.94 inch high about the hole 1.25 inch, which opened out with a star of cracks from the point of the projectile. Three large pieces of the bulge were broken off.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 1.62 inch deep. A fragment of the plate 9 by 4 by 2.5 inches adhered to the backing.

(See photographs Nos. 8, 22, 23, 24.)

Round 5.

Second shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel Harvey plate. Time, 9:41:15 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the right side of the plate.

The projectile entered and remained apparently intact in the plate, the base projecting 2.44 inches from the face of the plate, the axis slightly inclined to the normal.

The estimated penetration of the point was 14.86 inches.

A bulge was formed on the face of the plate 15.5 inches in diameter, with a ragged fringe about the hole 2 inches high and a number of radial hair cracks in the bulge not over 4 inches long.

A bulge on the back of the plate was 22 inches in diameter and 4.75 inches high about the hole 5.12 inches wide, which opened out with a star of deep cracks from the point of the projectile.

The indent in the backing was jagged, corresponding in shape to the back bulge, 11 inches in diameter and 4 inches deep. The course of the backing next to the plate was split between shot holes No. 1 and No. 2.

One of the side plate bolts was started.

(See photographs Nos. 9, 25, 26, 27.)

Round 6.

Second shot at Bethlehem Iron Company's high-carbon nickel-steel Harvey plate. Time, 9:48:40 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the top and 24 inches from the right side of the plate.

The point of the projectile entered and remained in the plate, presenting an appearance of being welded therein, the end of the chamber 0.5 inch outside of the plate; the body and base were broken into many small fragments, none of which were recovered.

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The estimated penetration of the point was 6.82 inches.

A bulge was formed on the face of the plate 12.75 inches in diameter. Near the head of the projectile the metal of the plate was dished in and scarcely distinguishable from that of the projectile remaining in the plate. A few short radial hair cracks were in the bulge.

The bulge on the back of the plate was nearly imperceptible, but was found to be 18 inches in diameter and 0.25 inch high.

No cracks.

There was a discoloration of the backing opposite the back bulge but no indent.

A head of one of the side plate bolts was broken.

(See photographs Nos. 10, 28, 29, 30.)

Round 7.

Third shot at Carnegie, Phipps & Co.'s high-carbon nickel-steel plate. Time, 9:55:40 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered the plate and rebounded, broken into several large and a number of small pieces; some of the former recovered, among which was half of the head, which had been split longitudinally.

The penetration of the point was 12 inches.

A bulge was formed on the face of the plate 19.25 inches in diameter, with an irregular curling fringe partly chipped off about the hole 1.75 inch high, and a few short radial hair cracks in the bulge.

A through crack extended from this hole to the bottom of the plate 28.75 inches from the left lower corner, which was sprung out about 0.5 inch.

The bulge on the back of the plate was 16 inches in diameter and 2.37 inches high about the hole 2 inches wide, which opened out with a star of cracks from the point of the projectile; about half of the bulge was broken out to a depth of about 1.5 inch.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 2.5 inches deep. One small fragment of the plate was imbedded in the backing.

(See photographs Nos. 11, 22, 23, 24.)

Round 8.

Third shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel Harvey plate. Time, 10:2:15 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered the plate and rebounded to the front 12 feet 6 inches, and thence ricocheted 35 feet 2 inches beyond. It was considerably upset, being shortened 2.09 inches and expanded at the bourrelet 0.86 inch, at the body 0.58 inch, and at the base 0.01 inch. A number of small thin pieces flaked off the head.

The penetration of the point was 9.75 inches.

A bulge was formed on the face of the plate 16.75 inches, with an irregular, ragged, curling fringe 2.25 inches high about the hole and a number of radial hair cracks in the bulge not over 4 inches long.

The bulge on the back of the plate was 19.5 inches in diameter and 1.81 inch high about the hole 1.25 inch wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge, and was 11 inches in diameter and 1.37 inch deep.

(See photographs Nos. 12, 25, 26, 27.)

Round 9.

Third shot at Bethlehem Iron Company's high-carbon nickel-steel Harvey plate. Time, 10:9:30 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the left side of the plate.

The projectile entered the plate and rebounded 37 feet 10 inches to the front and thence ricocheted 19 feet farther. The projectile was unbroken, but there was a longitudinal crack from bourrelet to band score. It was shortened 0.14 inch and expanded at bourrelet 0.015 inch, at body 0.05 inch, at base 0.01 inch.

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The penetration of the point was 12.25 inches.

A bulge was formed on the face of the plate 18 inches in diameter, with an irregular chipped fringe about the hole 1.5 inch high, and a number of radial hair cracks in the bulge not over 5 inches long. There were also three deeper radial cracks—two 6 inches, and one 5.5 inches long.

The bulge on the back of the plate was 15.25 inches in diameter and 2.12 inches high near the hole 1 inch wide which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 12 inches in diameter and 1.25 inch deep.

One of the backing bolts was started back 1.5 inch.

(See photographs Nos. 13, 28, 29, 30.)

Round 10.

Fourth shot at Carnegie, Phipps & Co.'s high-carbon nickel-steel plate. Time, 10:16:50 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The projectile entered the plate and rebounded 47 feet 10 inches to the front; in it were two longitudinal cracks, one from the bourrelet to the base, apparently a through crack, and the other extending from the bourrelet to the band score.

The projectile was shortened 0.11 inch and expanded at the bourrelet 0.03 inch, at the body 0.08 inch, and at the base 0.02 inch.

The penetration of the point was 11.87 inches.

A bulge was formed on the face of the plate 18 inches in diameter with a curling fringe about the hole, partly chipped off, 1.87 inch high, and several radial hair cracks in the bulge not over 3 inches long.

One through crack extended from this through No. 3 hole to the side of the plate, 35.5 inches from the left lower corner, and the one mentioned in round 7 was slightly opened.

The bulge on the back of the plate was 20 inches in diameter and 2.87 inches high around the hole, 2.75 inches wide, opening out with a star of cracks from the point of the projectile.

The indent in the backing corresponded in shape to the back bulge and was 11 inches in diameter and 2 inches deep, with a small fragment of the plate sticking therein.

Both of the lugs of the bottom clamp holding the side plates were cracked.

(See photographs Nos. 14, 17, 22, 23, 24.)

Round 11.

Fourth shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel Harvey plate. Time, 10:23:17 a. m.

Gun.—6-inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The projectile entered and remained, apparently intact, in the plate, with the base 3.3 inside the face.

The penetration of the projectile was 20.5 inches.

A bulge was formed on the face of the plate 16.5 inches in diameter, with a broken curling fringe about the hole 2 inches high and a few radial hair cracks in the bulge about 3 inches in length.

The bulge on the back of the plate was 18 inches in diameter and 4.62 inches high about the projectile, with a star of cracks extending therefrom.

The indent in the backing was a jagged hole 12 inch in diameter corresponding to the back bulge, with the imprint of the point of the projectile 10 inches deep, and two small fragments of the plate sticking therein.

(See photographs Nos. 15, 17, 25, 26, 27.)

Round 12.

Fourth shot at Bethlehem Iron Company's high-carbon nickel-steel Harvey plate. Time, 10:30:12 a. m.

Gun.—6 inch B. L. R.

The point of impact was 24 inches from the bottom and 24 inches from the right side of the plate.

The point of the projectile entered and remained in the plate, presenting an appearance of being welded therein, the end of the chamber being level with the face of the plate. The base and body of the projectile were broken into many small fragments.

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The estimated penetration of the point was 7.32 inches.

A bulge was formed on the face of the plate 13.75 inches in diameter. Near the head of the projectile the metal of the plate was dished in and scarcely distinguishable from that of the projectile remaining in the plate. A few radial hair cracks were in the bulge, of varying lengths, none over 6 inch, and a few pieces of metal were scaled off in the bulge.

The bulge on the back of the plate was nearly imperceptible, but was found to be 17 inch in diameter and 0.31 inch high.

No cracks.

There was a discoloration of the backing opposite the back bulge, but no indent. (See photographs Nos. 16, 17, 28, 29, 30.)

Round 13.

Fifth shot at Carnegie, Phipps & Co.'s high-carbon nickel-steel plate. Time, 12:9:48 p. m.

Gun.—8-inch B. L. R.

Projectile.—8-inch Carpenter armor piercing shell of 250 pounds.

The point of impact was the center of the plate.

The projectile entered and rebounded 6 feet 3 inches to the front, very much set up and cracked. The cracks were generally longitudinal, and many thin pieces flaked off from the head. The projectile was very hot and was still warm an hour after. It was shortened 3.58 inches, and expanded at bourrelet 1.65 inch, at the body 0.97 inch, at the base 0.28 inch.

The penetration of the point was 9.62 inch.

A bulge was formed on the face of the plate 20 inches in diameter, with an irregular fringe about the hole 1.75 inch high and a few radial hair cracks in the bulge.

A through crack extended from the No. 3 through No. 5 and No. 2 holes to the right side of the plate, 7 inches from the top, and those developed at No. 3 and No. 4 shots were somewhat opened.

In addition to the through cracks on the face of the plate, the following, extending nearly through the plate, were found on the back: One from No. 5 through No. 1 hole to the top of the plate, 15.5 inches from the left upper corner, and one from No. 4 hole to the right side of the plate, 18 inches from the right lower corner.

The bulge on the back of the plate was 25 inches in diameter and 1.56 inch high, about the hole 1.25 inch wide, which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded to the back bulge and was 13 inches in diameter and 1 inch deep.

The middle armor bolt of the second row from the bottom was broken at the plate and thrown 2 feet to the rear; both of the lugs of the bottom clamp for the side plates were broken. The backing structure was set back 0.5 of an inch, and the course of backing next to the plate was split.

When the plate was removed from the backing the left lower corner separated from the remainder of the plate. The armor bolt above No. 5 hole stuck in the plate; the one below it was broken off flush with the back of the plate; the remaining bolts were easily unscrewed.

The top of the plate was after the firing sprung 0.25 of an inch away from the backing.

(See photographs 18, 21, 22, 23, and 24.)

Round 14.

Fifth shot at Carnegie, Phipps & Co.'s low-carbon nickel-steel Harvey plate. Time, 12:19:50 p. m.

Gun.—8-inch B. L. R.

Projectile.—8-inch Carpenter armor piercing shell of 250 pounds.

The point of impact was the center of the plate.

The projectile entered the plate, rebounded 33 feet to the front, broke into several pieces, the head being thrown 22 feet 10 inches to the front, and the body 33 feet to the right. The extreme point of the head was bruised and a piece chipped off.

The penetration of the point of the projectile was 17.25 inches.

A bulge was formed on the surface of the plate 18.5 inches in diameter, with an irregular broken fringe about the hole 2.5 inches high, and a few radial hair cracks in the bulge.

Through cracks extended from hole No. 5 through No. 1 to the top of the plate, 6.75 inches from the left upper corner, and through No. 3 to the bottom of the plate, 11 inches from the left lower corner; a deep crack extended from No. 5 to No. 2 hole.

In addition to the through cracks on the face of the plate a crack reaching nearly through the plate extended on the back from No. 5 through No. 4 hole to the bottom of the plate, 14.25 inches from the right lower corner.

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The bulge on the back of the plate was 26 inches in diameter and 6.75 inches high at the hole, 5.5 inches wide, which opened out with a star of cracks from the point of the projectile.

There was a jagged depression in the backing 16 inches in diameter and 5.5 inches deep, with a small fragment of the metal sticking therein. The course of the backing next to the plate was split in the line of the upper backing bolts.

When the plate was removed from the backing it held together, and the bolts were easily unscrewed, excepting the one above and the one below No. 5 hole.

The top of the plate was after the firing sprung 0.25 inch away from the backing. (See photographs Nos. 19, 21, 25, 26, and 27.)

Round 15.

Fifth shot at Bethlehem Iron Company's high-carbon nickel-steel Harvey plate. Time, 12:37:33 p. m.

Gun.—8-inch B. L. R.

Projectile.—8-inch Firminy armor piercing shell of 210 pounds.

The point of impact was the center of the plate.

The projectile entered the plate and rebounded to the front 38 feet, then ricocheted violently against the timber protection of the gun, rebounding therefrom 6 feet. The projectile cracked longitudinally and flaked considerably at the rear of the head. On the body of the shell was a score which extended around the projectile at the section of a plane inclined to the axis. This score could have been formed by a rotary motion against a hard point, combined with a movement forward and back, and possibly was so done by the rotation of the projectile on entering and rebounding from the plate. The projectile was shortened 1.36 inch, and expanded at the bourrelet 0.31 inch, at the body 0.41 inch, at the base 0.03 inch.

The penetration of the point was 12.87 inches.

A bulge was formed on the face of the plate 17 inches in diameter, with the fringe around the hole chipped off and nowhere higher than 0.94 inch, and a number of radial hair cracks in the bulge, none over 7 inches long.

A through crack extended through hole No. 1 to the top of the plate 14 inches from the left upper corner, and another through hole No. 3 to the bottom of the plate 17.5 inches from the left lower corner.

The bulge on the back of the plate was 23 inches in diameter and 2.62 inches high about a hole 0.5 inch wide which opened out with a star of cracks from the point of the projectile.

The indent in the backing corresponded to the back bulge and was 15 inches in diameter and 2 inches deep.

The course of backing next to the plate was split in line of backing bolts. The lugs of the lower side-plate clamp were cracked and the left side plate was moved 0.25 inch to the left.

When the plate was removed from the backing it held together, and all the bolts were easily unscrewed excepting four, one above and one below No. 5 hole, and one at upper and one at lower left corner.

(See photographs Nos. 20, 21, 28, 29, and 30.)

SUMMARY.

After careful consideration of the results of the firing upon the six plates, it is the unanimous decision of the Board that they be placed in the following order of merit, viz:

(1) The high-carbon nickel-steel Harvey plate furnished by the Bethlehem Iron Company.

(2) The high-carbon nickel-steel plate furnished by the Bethlehem Iron Company.

(3) The high-carbon nickel-steel plate furnished by Carnegie, Phipps & Co.

(4) The low-carbon nickel-steel Harvey plate furnished by Carnegie, Phipps & Co.

(5) The low-carbon nickel-steel plate furnished by Carnegie, Phipps & Co,

(6) The low-carbon steel Harvey plate furnished by the Bethlehem Iron Company.

The right side of plate No. 1 showed very remarkable qualities. The two projectiles which struck that side penetrated not more than 7 inches, the head remaining in the plate completely filling the hole, and with the appearance of having been welded to the surrounding metal, while the body was shattered into many fragments.

No cracks were made on that side of the plate.

The back of the plate on that side showed no disturbance except a hardly noticeable swelling on the surface.

It is to be noted that the upper part of plate No. 6 (Harveyed) showed qualities resembling those of the right side of No. 1, while, on the other hand, Plate No. 4 (likewise Harveyed) was totally lacking in such characteristics.*

* The method of tempering at Bethlehem differed from that at Pittsburg.—Note by Departmental authority.

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Plate No. 2 showed a great degree of uniformity as well as resistance to penetration.

The small penetration of the 8-inch shot in plate No. 3 is, in the opinion of the Board, due to the excessive upsetting of the projectile.

All of the armor plates were more or less cracked through, but only two, Nos. 3 and 6, badly, and these two plates alone showed cracking before the fifth shot. Plates Nos. 1, 2, and 3 kept out all the projectiles; No. 4 was perforated by one, and Nos. 5 and 6 by two projectiles each.

It will be noticed that the "high-carbon" plates show better results than those of "low carbon," but it is believed that the chemical analyses of the plates now in progress will show that the words "high" and "low," employed by the manufacturers, have been used arbitrarily and have but little value for purposes of comparison.

The Holtzer and Firminy projectiles were part of the lot used at the Annapolis armor trials of last year.

Comparing the plates of this trial with the Creusôt steel and the Creusôt nickel-steel plates of the Annapolis trials of September, 1890, the Board is of the unanimous opinion that—

No. 1, the high-carbon nickel-steel Harvey plate furnished by the Bethlehem Iron Company, and

No. 2, the high-carbon nickel-steel plate furnished by the Bethlehem Iron Company,

are superior to the Creusôt steel and nickel-steel plates of last year.

In this connection it should be considered that the firing at this year's trial was more rapid than at last year's, and that the interval between the fourth and fifth shots at each plate was about two hours instead of four days as then. At this trial the plates were still "singing" from the blows of the 6-inch when they were struck by the 8-inch projectiles.

The board will, in obedience to the Department's order, make a supplemental report upon a "high-carbon nickel-steel Harvey" plate and a "low-carbon steel Harvey" plate, to be furnished by Carnegie, Phipps & Co., which will be tried as soon as ready under the same conditions as the six plates whose trial has been completed.

The following are appended to this report:

Copy of the Department's order of September 29, 1891.
Copy of the Department's order of November 2, 1891.
Copy of the Department's order of November 20, 1891.
Copy of drawing of the target structure.
Copy of drawing of the armor bolts.
Three penetration diagrams.
Photographs.
Minutes of the proceedings of the Board.

The chemical analyses of the plates and projectiles will be submitted to the Department when completed.

Very respectfully,

L. A. KIMBERLY,
Rear-Admiral, U. S. N., President of the Board.
E. O. MATTHEWS,
Captain, U. S. N., Member.
W. R. BRIDGMAN,
Commander, U. S. N., Member.
ALBERT S. BARKER,
Commander, U. S. N., Member.
F. E. CHADWICK,
Commander, U. S. N., Member.
C. H. DAVIS,
Commander, U. S. N., Member.
A. R. COUDEN,
Lieut. Commander, U. S. N., Member.
B. H. BUCKINGHAM,
Lieutenant, U. S. N., Member and Recorder.
W. H. H. SOUTHERLAND,
Lieutenant, U. S. N., Member.
PHILIP R. ALGER,
Professor, U. S. N., Member.
J. J. WOODWARD,
Naval Constructor, U. S. N., Member.
LIONEL R. LENOX,
Chemist, Navy-Yard, Washington, D. C., Member.

THE SECRETARY OF THE NAVY.

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REPORT

OF THE

CHIEF OF THE BUREAU OF CONSTRUCTION AND REPAIR.

NAVY DEPARTMENT,
BUREAU OF CONSTRUCTION AND REPAIR,
Washington, D. C., October 15, 1891.

SIR: In obedience to the Department's instructions, I have the honor to submit my annual report for the fiscal year ending June 30, 1891, showing the work performed and the amounts expended, together with the estimates for the fiscal year ending June 30, 1893.

The estimates for the expenses of the Bureau, as given in the statement marked A, are in accordance with existing laws.

The estimate marked B is for the general repair of vessels at navy-yards and on foreign stations, purchase of stores, materials, machinery, and tools of all kinds, preservation of material and stores, and for the general care and preservation of the navy in the line of construction and repair.

The estimates in the statement marked C are for the pay of such clerks and writers at the several navy-yards as are indispensable for the proper and systematic prosecution of the work.

The estimate marked D is for the hull and outfits of new vessels.

The estimate marked D-Special is for the improvement of navy-yard plants and for an experimental tank for use in determining the resistance of ships by the use of models.

APPENDIXES E, F, G, H, I, K, L, AND M.

Appendix E is a list of the vessels which have been repaired at the navy-yards during the fiscal year 1890–'91.

Appendix F is a list of the expenditures under the different appropriations during the year.

Appendix G is a statement of the amounts expended on new vessels under construction at the several navy yards, and for outfit of other vessels the hull and machinery of which were built or are building under contract; also amounts expended for draftsmen, copyists, writers, etc.

Appendix H shows the number of payments and the amounts thereof on account of the various vessels building under contract.

Appendix I is a list of the vessels of the Navy divided into groups under heads of "Armored vessels," including single-turreted monitors, "Unarmored steel vessels," "Torpedo boats," "Iron steam vessels," "Wooden steam vessels," "Wooden sailing vessels," "Tug-boats," and "Vessels unfit for sea service."

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Appendix K contains reports from naval constructors, showing condition of work July 1, 1891, on vessels building or completing at navy-yards or under contract at private yards.

Appendix L contains supplementary reports showing progress of work from July 1 to October 1, 1891, on vessels building or completing at navy-yards or under contract at private yards.

Appendix M contains reports from naval constructors regarding improvements needed at navy-yards in the plants for shipbuilding or repair work.

ASSISTANT CHIEF OF THE BUREAU.

The absence of the Chief of the Bureau upon tours of inspection, or from sickness or other unavoidable causes, often results in serious delay to the business of the Bureau, as, in accordance with the existing laws, the acting chief of the Bureau (the chief clerk) is one having no technical training; and as even the routine work of the Bureau involves matters of the greatest technical importance, which he is not, from want of professional knowledge, capable of directing, I must again call the attention of the Department to the necessity of providing by law for an assistant chief of Bureau, who, being fitted by experience and professional training, will be qualified to act during the absence of the Chief of the Bureau.

CHIEF CLERK OF THE BUREAU.

The duties of this office are arduous, and upon their satisfactory performance, much of the efficiency of the Bureau depends. In view of the importance of the work performed, it is believed that an increase of salary to $2,500 per annum is fully deserved, and this increase is earnestly recommended.

DRAFTING WORK IN THE BUREAU.

During the past year plans and specifications have been prepared for the triple-screw cruiser No. 13, which is to be similar to cruiser No. 12, and embodies the latest improvements in high-speed vessels, designed as commerce destroyers. Plans and specifications have also been prepared for a 22-knot torpedo cruiser, and a 24-knot sea-going torpedo boat. With the completion of these designs, the Bureau has finished all the work authorized by recent legislation, as far as the designing is concerned.

The Bureau recommends that the position of chief draftsman, with a salary of $2,500 per year, be established for this Bureau, as the work in hand requires such an appointment, and a similar rating is at present allowed for the Bureau of Steam Engineering.

Mr. William T. Powell has been acting in this capacity for many years with perfect satisfaction to the Bureau. The responsibilities of this position can be appreciated when it is understood that he has charge of the designing staff, and all plans for building, repairing, or changing vessels are under his supervision. The pay which can be given to Mr. Powell under present appropriations is not commensurate with the work which he is called upon to do, and it is earnestly requested that the recommendation for a chief draftsman receive the favorable consideration of the Department.

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SURVEYS.

The following vessels have been surveyed and repairs ordered during the fiscal year 1890–'91, at the estimated costs stated below:

Name of vessel.	Estimated cost of repairs.	Date of survey.	When and where repairs have been ordered made.
Adams	$28,000.00	Nov. 17, 1890	Mare Island, Sept. 8, 1891.
Atlanta	12,053.00	Oct. 15, 1890	Norfolk, Oct. 24, 1890.
Boston	10,523.00	Aug. 15, 1890	New York, Aug. 26, 1890.
Chicago	9,309.00	Oct. 9, 1890	New York, Oct. 17, 1890.
Constellation	6,190.00	Mar. 18, 1891	Norfolk, Mar. 24, 1891.
Camanche	400.00	Jan. 3, 1891	Mare Island, Feb. 7, 1891.
Dolphin	12,745.00	Apr. 30, 1891	Norfolk, May 21, 1891.
Dale	1,142.59	Mar. 25, 1890	Washington, D. C., Apr. 7, 1891.
Fortune	3,112.15	Dec. 29, 1890	Portsmouth, N. H., Jan. 16, 1891.
Monongahela	*28,300.00	July 26, 1890	Portsmouth, N. H., Sept. 3, 1890.
Nina	258.50	Oct. 27, 1890	New York, November, 11, 1890.
Do	2,460.20	May 1, 1891	New York, May 12, 1891.
Thetis	2,873.00	Mar. 3, 1891	Mare Island, March 13, 1891.
Tug Standish	8,992.00	July 16, 1890	Norfolk, July 31, 1890.
Yantic	1,360.00	May 7, 1891	New York, May 15, 1891.
Yorktown	1,729.00	May 28, 1891	Norfolk, May 26, 1891.

* Allowed $25,000.

VESSELS CONDEMNED AND RECOMMENDED TO BE SOLD.

The following-named vessels, having been surveyed and the cost of repairs ascertained to be in excess of the 20 per cent limit allowed by law, are recommended to be sold: *Galena* and *Speedwell*. The care of these vessels is a source of expense to this Bureau, and as they are of no service whatever the best interests of the Government require their immediate sale.

LIST OF VESSELS SOLD.

The following-named vessels have been sold during the fiscal year 1890–'91, for the amounts stated:

Name of vessel.	Where sold.	Date of sale.	Price received for vessel.
Juniata	Navy-yard, Kittery	Mar. 25, 1891	$15,800
Quinnebaug	Navy-yard, New York	....do	18,000
Pilgrim	Navy-yard, League Island	....do	1,130
Rescue	Navy-yard, Washington	....do	900
Sangus	....do	....do	15,140
Brooklyn	Navy-yard, Norfolk	....do	13,128
Ossipee	....do	....do	15,315
Triana	Cuttyhunk, Mass	May 2, 1891	100

THE SINGLE-TURRET MONITORS.

The attention of the Department is again directed to these vessels, which are at present a source of expense and, not being kept in efficient repair, of no use whatever in an emergency. It is recommended that some action be taken by the Department by which such of them as are in condition to justify such an expenditure may be overhauled and thoroughly repaired. The remainder, that are found on examination not to be worth repairing, to be sold.

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For a comparative moderate sum they can be made useful adjuncts to whatever other means the country may possess of repelling an enemy; their shallow draft rendering them especially adaptable for service in the smaller harbors of our own coast, which sea-going armored vessels of modern design can not enter on account of their great draft, and where consequently they would only be exposed to the attacks of unarmored cruisers.

THE INTREPID.

The Bureau desires to repeat the recommendation made in its last report that the *Intrepid* be condemned and sold at public auction. The boilers intended for her have been put into another vessel, and she is in a most dilapidated condition, her frame and such few plates as are on her bottom being so corroded as to be useless.

This vessel is at present hauled out on the ways at the navy-yard, New York, where she occupies a much-needed space.

THE WOODEN STEAM VESSELS OF THE NAVY.

The wooden steam vessels of the Navy are rapidly disappearing from the active list of the service, some being condemned, some having been sold, while others are being utilized as training and receiving ships, and still others are laid up in ordinary, having exceeded the 20 per cent limit allowed for the repairs of such vessels. Only twelve are now available for cruising purposes, and they, within five or six years, will be mustered out of service, as their repairs exceed the limitary amount fixed for that purpose.

There are two second-rate vessels remaining, viz, the *Lancaster* and *Pensacola*. It was the intention of the Department to have the *Lancaster* fitted out with modern guns, that she might be used as a gunnery training ship; the demands of the service, however, required her for duty on the Asiatic station, and she was sent to that squadron with her original battery of smoothbore guns. New boilers having been placed in the vessel during the year, and general repairs completed, she is able to remain in the service from five to six years more.

The condition of the *Pensacola* will probably justify her being retained in active service about one year more.

There are ten third-rate vessels remaining, as follows: *Marion*, *Mohican*, *Iroquois*, *Kearsarge*, *Adams*, *Alliance*, *Essex*, *Tallapoosa*, *Yantic*, and *Thetis*.

The repairs on the *Marion* were completed at the navy-yard, Mare Island, California, June 1, 1891; she will probably be in condition to remain in active service for three years longer. The repairs on the *Mohican* were completed in June, 1891, at the navy-yard, Mare Island, California. It is probable that she will be able to remain in active service for three years more. It is not probable that the *Iroquois* and *Kearsarge* will last more than two years, while the *Adams*, which is now being repaired at Mare Island, will, upon completion of such work, be able to remain in active service about three years. The *Alliance* will last about two years and the *Essex* not more than three. The *Tallapoosa*, which is on the South Atlantic station, will be put out of commission and sold as soon as relieved by another vessel. The repairs on the *Yantic* have been completed at the New York navy-yard, and boilers which were made for the *Intrepid* have been placed in her. She should last about five or six years longer. The *Thetis*, in her present condition, may continue in service about two years more.

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The following vessels are in ordinary, subject to the action of the Department: *Omaha*, *Swatara*, and *Nipsic*.

The *Omaha* was surveyed on July 3, 1891, at the navy-yard, Mare Island, California. The board reported that her hull could be repaired at 8 per cent of total cost of a new vessel of similar character, but as the repairs to her machinery are estimated to cost 32 per cent, or 12 per cent more than the amount allowed by law, the board on construction has recommended that she be not repaired.

The *Swatara* and *Nipsic* are in ordinary at the navy-yard, Mare Island, California, and will not probably be fitted out again for active service.

During the present year the *Enterprise* was detached from the North Atlantic squadron and ordered to Annapolis, Md., for service there as training ship for the naval cadets.

TORPEDO CRUISER NO. 1.

The usefulness of this class of vessels has been shown very clearly in the late Chilean revolutionary war, when the ironclad *Blanco Encalada* was torpedoed and sunk by the torpedo gunboats *Almirante Condell* and *Almirante Lynch;* owing to their size, and consequent less fatigue of crew, together with an ample coal supply, they were enabled to operate a long distance from their base of supplies. If they had not possessed these features, especially the ability to keep the sea, the attempt would doubtless have been unsuccessful, if indeed attempted at all.

The particular functions of this class of vessels are to chase and destroy torpedo boats, to act as torpedo boats themselves when opportunity presents itself, and as lookout and dispatch vessels in fleet operations. To this end they are to be provided with batteries of numerous quick-firing guns of sufficient power to penetrate any unarmored vessel, with very high speed, and with efficient torpedo-launching apparatus. In addition, the machinery is protected by a judicious arrangement of the coal bunkers, in combination with thin armor plates.

Congress, under the act approved June 30, 1890, appropriated for one swift torpedo cruiser of about 750 tons displacement, to cost, exclusive of armament, not more than $350,000. Plans in accordance with the above act were prepared in the Bureau by the instructions of the Department; the term "swift" being fixed as not less than 23 knots per hour on the measured mile. Bids were asked for from all reputable shipbuilders, but none were received, as the amount appropriated was considered too small.

In view of the fact that this class of vessels is at present receiving great attention from many naval powers, the Bureau has to recommend to the Department that Congress be asked to increase the appropriation to $512,000, being an increase of $162,000 above the amount originally appropriated.

The high cost is due to the great power of the engines of the vessel, which are required to develop 6,000 I. H. P., and are estimated to cost $325,000. This power, remarkable for a vessel of this size, should enable the required speed of 23 knots to be obtained without difficulty, and will give the Navy a vessel unsurpassed in her class by any contemplated abroad.

VESSELS IN COURSE OF CONSTRUCTION.

Appendices K and L contain reports from naval constructors showing the condition of work on vessels in course of construction at navy-yards or under contract at private yards.

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The Bureau takes great pleasure in calling the attention of the Department to the satisfactory progress made in the construction of the coast line battle ships *Massachusetts*, *Indiana*, and *Oregon*. These vessels are the most important of any whose construction the Department has yet undertaken, and on their completion the Government will be in possession of a type of ship whose powers of offense and defense are unsurpassed by any vessel yet designed; for not only is the battery more powerful, but all of the guns' crews, with the exception of those of the 6-pounder rapid-fire guns, have armored protection on all sides from an enemy's rapid-fire guns, the 13-inch and 8-inch B. L. R. being placed in closed revolving turrets, while the 6-inch B. L. R. are in armored casements, protected on the inboard side by armored screens which completely inclose the gun stations. This feature of the design, namely, giving the gun crews of the 6-inch and 8-inch B. L. R. armored protection on all sides from the disastrous effect of the projectiles of rapid-fire guns, is adopted in all the most recent foreign designs.

Another important advantage possessed by these vessels is their moderate draft. While contemporary designs of vessels of this class have a normal mean draft of between 27 and 30 feet, our battle ships have a corresponding draft of only 24 feet. For vessels intended for service upon our coasts, this moderate draft is an essential, the greater draft of foreign battle ships precluding their entry into almost all of our important harbors, into which our new battle ships will enter without difficulty.

The total coal capacity of the bunkers is 1,800 tons, and the coal supply at normal draft is 400 tons. This last amount was intentionally made moderate; and when it is considered that this represents the amount of coal that should be on board at the time the vessel is about to go into action, it is evident that there is a greater weight available for guns, armor, etc., than would have been the case with a large coal supply in this condition. In other words, ample stowage space is provided so that the vessel can move over an extended field of action; but she is designed to carry *into action* a smaller amount of reserve coal, and a greater weight of armor and ordnance than has been customary in previous designs, for the purpose of making the vessel the most powerful *fighting ship* possible. To increase the coal supply at normal draft would be to take away just so much weight from that now given to the battery and armor; and it would appear that the weight is better employed in giving the ship a battery that is unequaled in power by any vessel yet designed.

ARMORED CRUISER MAINE.

The U. S. S. *Maine* was successfully launched at the New York navy-yard on November 18, 1890, and work upon her is progressing in a satisfactory manner, although there has been some delay caused by the nondelivery of armor plates of transverse armored bulkhead and of inclined protective deck. The templates and plans for the side armor plates have been made, and the vessel is ready to receive her side armor as soon as delivered; the wood backing could be put on at once, but, as it will requlre only about a month to do so, it is preferable to wait until the vessel goes into dock so that the backing may not deteriorate during the interval that may elapse before the armor is ready to be put in place.

On July 7, 1890, alterations were authorized in the plans of the turrets of the *Maine*, by which their weight was reduced 134.52 tons, and

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this weight was redistributed by increasing the thickness of the proposed barbette armor from 10½ inches to 12 inches, and increasing the thickness of the side armor belt from 11 to 12 inches. A plan is annexed showing the present appearance of the design of the vessel.

In a report dated October 2, 1891 (see Appendix L), the naval constructor states that on October 1, 63 per cent of the work on this vessel, not including armor, was completed.

HARBOR DEFENSE RAM.

Congress, by act of March 2, 1889, authorized the construction of a twin-screw, armor-plated, harbor-defense ram, upon the design of Rear-Admiral Ammen, U. S. Navy.

Bids for this vessel, which was described in the Bureau's report for 1890, were opened on December 20, 1890, and the contract was awarded on January 28, 1891, to the Bath Iron Works, situated at Bath, Me., the vessel to be completed eighteen months from date of contract.

On March 27, 1891, the Department approved the proposition of the Bath Iron Works to increase the length of the vessel from 243 to 251 feet, with a corresponding increase of displacement of 133 tons. The additional displacement is utilized in providing greater coal capacity, the coal supply at normal draft being increased 50 tons, making a total supply of 180 tons; the shape of stem is also slightly altered in order to obtain better manoeuvering qualities and greater strength; the height of conning tower is increased; and finally the vessel is provided with a battery of four 6-pounder rapid-fire guns, for use in protection from torpedo-boat attacks.

Plans are appended showing the present arrangement of the vessel.

PROTECTED CRUISER NO. 13.

This vessel is a sister ship of Cruiser No. 12, better known, perhaps, as the *Pirate*, and is similar to her in hull, engines, and armament. Her construction was authorized by the naval appropriation act approved March 2, 1891; under date of March 11, 1891, bids were advertised for, and they were opened June 1, 1891. The contract was awarded to the William Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa., and provides for the completion of the vessel two years from date of contract.

Cruisers Nos. 12 and 13 are of quite a different type from the ordinary protected cruiser, their function being not only to act as commerce destroyers, but to advantageously engage the converted commerce destroyers, their armament and protection being sufficiently heavy for this purpose. The features to which prominent attention have been given in the design are speed and endurance, the total coal bunker capacity of No. 13 being 2,400 tons.

These vessels have occasioned considerable comment abroad, some very able English critics contending that England has at present no type able to cope with them.

The dimensions of No. 13 are as follows:

Length on load line	feet..	412
Beam (extreme)	do...	58.18
Draft (mean normal)	do...	22.54
Displacement (normal)	tons..	7,350
Coal supply at normal displacement	do...	750
Sustained speed	knots..	21
Maximum speed	do...	22
Indicated horse power		21,000

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Armament.—The main battery consists of one 8-inch breech-loading rifle, two 6-inch rapid-fire breech-loading rifles, and eight 4-inch rapid-fire breech-loading rifles. The secondary battery consists of twelve 6-pounder rapid-fire guns, four 1-pounder rapid-fire guns, and four gatlings. There are five torpedo-launching tubes.

Machinery.—The arrangement of the motive power will be similar to that of No. 12, the power being transmitted through three screws, the after screw being placed as in ordinary single-screw ships, the others being placed their own diameter forward and supported by brackets as usual in twin-screw vessels. Much has been said for and against the use of three screws, but the experience of the new and powerful transatlantic "liners" fitted with twin screws tends to confirm the wisdom of fitting the triple screws to our new cruisers.

In the "liners" comparatively slow moving machinery is fitted, these in turn require propellers of large diameter; to obtain the necessary clearance from the hull these screws must be brought out and upward, bringing them near the load line; consequently when the vessel is rolling and pitching they race considerably, causing a large reduction in the speed of the vessel. In our new cruisers Nos. 12 and 13, however, machinery of much greater piston speed is used, owing in a measure to its being divided into three parts instead of two. As a consequence the diameter of the screws is largely reduced, giving them good immersion, especially to the central screw which will be immersed in almost all conditions. This would tell greatly in a chase after a liner whose screws might be racing, and would compensate for the advantage of greater length possessed by the vessel built for commercial purposes.

There are three sets of triple expansion, vertical, inverted three cylinder engines, the total I. H. P. at 129 revolutions per minute being 21,000. The boilers are double-ended, eight in number, and placed in four water-tight compartments; all are constructed of steel for a working pressure of 160 pounds. The boilers for this vessel have the heating surface increased some 14 per cent over those designed for No. 12, the total surface being 49,248 square feet. Some idea of this surface can be formed by stating that it is equal to 1¼ acres. Taking for one horse power 3 square feet of heating surface for sustaining sea speed, we have 16,400 I. H. P., capable of driving the vessel at a speed of 21 knots per hour.

The hull is of steel, the vitals of the ship and its stability being well protected, and the gun stations shielded against machine-gun fire. The accommodations for officers and crew are spacious, well ventilated, and lighted by incandescent electric lights. An inspection of the plans will show the cellular construction of the hull, and the care taken to insure her stability by the small compartments adjacent to the load line; in the event of enough of these cells being filled to list the vessel to any extent, tanks within and above the double bottom have been provided for righting purposes.

The scantlings are as follows: Outer keel plate, 25 pounds; inner, 22½ pounds. The vertical keel is of 20 pounds by 42 inches. The transverse frames in the double bottom and below the protective deck are formed of frame bars 5 inches by 3½ inches by 12 pounds, and reverse bars 5 inches by 3 inches by 10 pounds, and 4 inches by 3½ inches by 9 pounds above the margin plate, bracketed together by plates of 12½ and 10 pounds square foot. Elsewhere the frames are of Z-bars 6 inches by 3½ inches by 3½ inches of 15 pounds per foot.

The longitudinals are of plating 16 pounds per square foot and angle bars 3 inches by 3 inches of 7 pounds per foot.

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The bottom plating is generally of 22½ pounds, the inner bottom being of 12½ pounds per square foot.

The upper deck stringers are 72 inches wide of 25 pounds per square foot, filled in between them with 10 pounds plating; the beams are 10 inches by 5⅜ inches of 31½ pounds per foot T-bulbs.

The bulkheads are of 7½ to 15 pounds per square foot well stiffened. The protective deck is 4 inches on the slopes and 2½ inches on the flat, being carried down at the extremities to stiffen the bow and protect the steering gear.

TORPEDO BOAT NO. 2.

The contract for this vessel was awarded on September 16 to the Iowa Iron Works, at Dubuque, Iowa, to be built in accordance with the plans and specifications furnished by the Department.

The principal dimensions, etc., of torpedo boat No. 2 are:

Length on normal load water line	feet..	150.00
Breadth at load water line	do...	15.50
Breadth, extreme	do...	15.62
Draft amidships, normal	do...	4.75
Normal displacement	tons..	120
Indicated horse power		1,800
Speed (at normal displacement)	knots..	24

The contract requires the completion of the vessel twelve months after date of contract, and the Bureau considers it a source of congratulation that it should be possible to build vessels of this class at a point so far removed from the seaboard, and where, in time of war, torpedo boats under construction would be safe from the attacks of an enemy's fleet. As the naval service only possesses one seagoing torpedo boat in commission and another under construction, one of the first necessities of a naval war would be the construction of a large number of these useful auxiliaries, and it would be a great advantage to be able to build them in a place of absolute safety from injury while under construction.

In the design of this boat the Bureau has given particular attention to the quarters for the officers and crew, believing that the radius of action of these vessels is limited rather by the endurance of the crew than by the amount of coal carried in the bunkers.

Two staterooms are provided for officers, and a large room extending the entire breadth of the boat and containing four bunks, is provided for petty officers. In the crew's quarters there are twelve bunks and swinging space for four hammocks.

The general construction will be on the transverse system. Special attention has been given to the longitudinal strength and stiffness of the vessel by the use of an intercostal vertical keel and broad, heavy stringer plates. The intercostal keel is used to thoroughly and rigidly connect the outer keel plate to the inner flat keelson, thus insuring against tripping of the floors and tending to reduce the vibrations caused by the engines, that are so often a source of great inconvenience and fatigue to the crews of these vessels.

The heavy stringers together with the coal bunker bulkheads and side plating, form large box girders on each side; these are unbroken throughout the machinery space and give the vessel extraordinary stiffness. Provision has been made at the ends of these girders so that they do not terminate abruptly. The flat keel is formed of plating one-fourth inch in thickness, the inner flat keelson plate being 12 by three-sixteenths inch; these are connected by the vertical keel, made of three sixteenth-inch plates and 1½ by 1½ by $\frac{3}{16}$ angle bars.

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The stem and stern posts are made of forged and cast steel combined.

The tranverse frames are to be spaced 18 inches beteen centers, and formed of angle bars $2\frac{1}{4}$ by $1\frac{1}{2}$ by $\frac{5}{16}$ inches, doubled at all bulkheads and reduced at the ends to 2 by $1\frac{3}{8}$ by $\frac{5}{16}$ inches; the floor plates to be 12 inches at the throat and three-sixteenths inch, except under the engine seatings where they are to be one-fourth inch in thickness; on the upper edges reverse bars $1\frac{3}{4}$ by $1\frac{3}{4}$ by $\frac{7}{32}$ inches will be worked from bilge to bilge.

The deck beams to be spaced 18 inches apart, with a crown of 18 inches in the full breadth, to be formed of angle bars, $2\frac{1}{4}$ by $1\frac{1}{2}$ by $\frac{5}{16}$ inch.

The upper deck stringer to be $\frac{7}{32}$ by 30 inches; between these stringers the deck will be covered with one-eighth-inch plating. On this plating strips of linoleum of convenient width will be placed for ease in walking.

The fore and aft bulkheads will be made of five thirty-second-inch plating, except at the engine seatings, where it will be one-fourth inch in thickness and securely tied to them.

At the bow a turtle-back deck will be worked to accommodate the torpedo tube and loading gear; the after end will work into and terminate in the conning tower.

The armament of the vessel will consist of one fixed tube in the bow, two diverging tubes on training circle aft, and 4 1-pounder machine guns.

The tubes will accommodate the new 18-inch Whitehead torpedo.

The motive power is derived from two coil or tubulous boilers, and will be transmitted through two screws, placed one slightly in advance of the other, though not overlapping, and actuated by two vertical inverted four-cylinder quadruple expansion direct-acting engines, with cylinder diameters of $11\frac{1}{2}$, 16, $21\frac{1}{2}$, and 30 inches by 16 inches stroke.

The propelling and circulating pump engines to have about 1,800 I. H. P. when the main engines are making about 412 revolutions per minute. The main valves will be of the piston type, except the low-pressure cylinders, which will be fitted with slide valves. The two boilers to be placed each in a watertight compartment, the engines to be placed between them.

An electric plant for lighting the vessel by the incandescent system and for operating a search light will be installed in the engine rooms.

An inspection of the accompanying plans will show that a minute subdivision of the hull has been aimed at and carried out as far as practicable.

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ARMOR REQUIRED FOR VESSELS NOW BUILDING.

The following list gives the amount, character, and thickness of armor that is required to be furnished by the Government for vessels now building:

Name of vessel.	Description of armor.		
	Name.	Thickness.	Weight.
		Inches.	*Tons.*
Maine	Belt	12	492.21
	Barbettes (2)	12	399.80
	Turrets (2)	8	133.14
	Conning tower	10	32.92
	Inclined deck, aft	3	51.80
	Bulkhead, forward	6	33.91
			1,143.78
Terror	Belt	7, 6	355.17
	Turrets (2)	11½, 12½	184.54
	Sight tower	12	13.74
	Smoke pipe	6	15.38
	Ventilator	6	8.48
			577.31
Amphitrite	Belt	9, 5	355.50
	Barbettes (2)	11½	147.00
	Turrets (2)	7½	109.25
	Conning tower	7½	17.50
	Conning tube	3	1.00
	Smoke pipe	6	15.50
	Ventilators	6	8.75
			654.50
Texas	Belt	12	282.60
	Diagonal	8	27.60
	Turrets (2)	12	214.84
	Redoubts	12	392.00
	Conning tower	12	41.93
	Armored tube	9, 6, 2, 1	53.58
			1,012.55
Monterey	Belt	13, 8, 6	335.74
	Barbettes (2)	13, 11½	157.53
	Turretts (2)	8, 7½	135.00
	Smoke pipe } Ventilator }	6	23.00
	Conning tower	10	25.74
			677.01
Puritan	Belt	14, 10, 6	584.00
	Barbettes (2)	14	
	Turrets (2)	8	446.00
	Sight tower	5½ to 8	
	Conning tower	10	35.00
	Smoke pipe	6	18.09
	Ventilator	6	9.20
			1,092.29
Monadnock	Belt	9, 5	355.50
	Barbettes (2)	11½	147.00
	Turrets (2)	7½	109.25
	Conning tower	7½	17.50
	Conning tube	3	1.00
	Smoke pipe	6	15.50
	Ventilator	6	8.75
			654.50
Harbor Defense Ram No. 1	Side and deck	6, 3, 2½	708.71
	Conning tower	18	
	Ventilator	6	64.60
	Smoke pipe	6	
			773.31

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Name of vessel.	Description of armor.		
	Name.	Thickness.	Weight.
		Inches.	*Tons.*
New York	Side	4	207.50
	Turrets	7 }	233.72
	Barbettes	10 }	
	Second battery	2	125.29
	Conning-tower tube	5	10.21
	Conning tower	7½	25.16
			601.88
Massachusetts	Belt	18	613.56
	Diagonal armor	14	261.58
	Barbettes	17, 10, 8	941.26
	Turrets	17, 8½, 6	587.94
	6-inch B. L. R. shield	4	60.00
	Casemate	4	180.00
	Conning tower and tube	10, 7	50.14
			2,694.48
Indiana	Belt	18	613.56
	Diagonal armor	14	261.58
	Barbettes	17, 10, 8	941.26
	Turrets	17, 8½, 6	587.94
	6-inch B. L. R. shield	4	60
	Casemate	4	180
	Conning tower and tube	10, 7	50.14
			2,694.48
Oregon	Belt	18	613.56
	Diagonal armor	14	261.58
	Barbettes	17, 10, 8	941.26
	Turrets	17, 8½, 6	587.94
	6-inch B. L. R. shield	4	60
	Casemate	4	180
	Conning tower and tube	10, 7	50.14
			2,694.48
Cruiser No. 6	Sponsons (10)	4	50.94
	6 pounder sponsons (10)	2½	23.18
	Conning tower, complete	5	36.93
	Turrets	3	.....
	Barbettes	4	112.42
			213.47
Cincinnati	Sponsons (8)	4	41.16
	Conning tower	2	9.09
	Secondary battery (6)	1	10
			60.25
Raleigh	Sponsons (8)	4	41.16
	Conning tower	2	9.09
	Secondary battery (6)	1	10
			60.25
Cruiser No. 9	Sponsons (8)	2¼	21.60
Cruiser No. 10	do	2¼	21.60
Cruiser No. 11	do	2¼	20.71
Cruiser No. 12	Conning tower shield	5	30.90
	Sponsons (8)	4	74.46
	6-pounder sponsons (6)	2	14.34
			119.70
Cruiser No. 13	Conning tower shield	5	30.90
	Sponsons (8)	4	74.46
	6-pounder sponsons (6)	2	14.34
			119.70
Gunboat No. 5	Sponsons (6)	4	19.00
Gunboat No. 6	do	4	19.00
Total amount of armor required			15,945.85

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Of this total amount of armor required, contracts have been made with the Bethlehem Iron Company of South Bethlehem, Pa., and Carnegie, Phipps & Co., of Pittsburg, Pa., for the amounts stated below.

The contracts with the Bethlehem Iron Company include the armor for the *Puritan*, *Terror*, *Amphitrite*, *Monadnock*, *Maine*, and *Texas*. The estimated weight of the armor, exclusive of bolts and accessories, is 5,310.64 tons. Preliminary drawings, giving sufficient data to allow the ingots for the plates to be gotten out and hammered to shape, have been furnished the Bureau of Ordnance for transmittal to the Bethlehem Iron Works for 3,672.76 tons of this armor; and finished plans and templates, showing the plates as required when completed, with all machining to be done, for 1,341.90 tons.

The contracts with Carnegie, Phipps & Co. include armor of a total weight of 6,043.18 tons, or of about 5,900 tons, exclusive of bolts and accessories, which will be divided between those vessels first requiring armor that are not included in the Bethlehem Iron Company's contract. Preliminary drawings, giving sufficient data to allow the ingots for the plates to be gotten out and hammered to shape, have been furnished the Bureau of Ordnance for transmittal to Carnegie, Phipps & Co., for 2,665.80 tons of this armor; and finished plans and templates, showing the plates as required when completed, with all machining to be done, for 1,017.35 tons.

There is therefore a balance of about 4,735.21 tons of armor, exclusive of bolts and accessories, yet to be contracted for, as is shown by the following statement:

		Tons.
Total armor required for ships building		15,945.85
Armor contracted for with Bethlehem Iron Company	5,310.64	
Armor contracted for with Carnegie, Phipps & Co	5,900.00	
		11,210.64
Remaining armor not yet contracted for		4,735.21

The Bureau does not desire to secure in position the wood backing of the armored vessels until a short time before the armor plates are delivered at the navy-yards, so that the backing may not deteriorate during the interval which must elapse before the armor can be put in place. On such of the ships at the different yards as are to receive the first armor delivered, the backing is, however, being put in place at once, so that as soon as any armor is received it may be secured in position immediately.

The wood backing for the monitors *Terror* and *Amphitrite* is partially in place, and these vessels will be ready to receive the armor ordered to be first delivered about November 1, 1891. The *Maine* is being delayed by the nondelivery of her transverse bulkhead armor, which she has been ready to receive for several months. The side armor plates for this vessel can be placed as soon as delivered, one month being sufficient time to put on the wood backing, which has not yet been done for the reason previously mentioned. The *Texas* will be ready for her diagonal armor on November 1, and for the side turret armor as soon as launched next spring. The *Puritan* and *Monadnock* can be made ready for their armor in about three months. All armored vessels being built at the navy-yards are therefore either ready to receive their armor at once, or can be made so in a short time.

Of the armored vessels building by contract, the *Monterey* and *New York* are ready for their armor, and the necessary drawings and templates for its manufacture have been sent to the armor manufacturers;

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the orders for the armor of the battle ships *Massachusetts*, *Indiana*, and *Oregon*, and the harbor defense ram, with the necessary drawings and templates, are being prepared as rapidly as the advancement of the vessels permit; the preliminary drawings of the deck armor for the ram, and the side and diagonal armor of the *Oregon*, having been already sent to Carnegie, Phipps & Co.

IMPROVEMENT OF NAVY-YARD PLANTS.

With the entry into active service of the new steel vessels of the Navy, the nature of the routine repairs that have to be performed at the various navy-yards upon ships in commission, has changed very much from that previously required with the wooden ships.

The amount of repairs requiring extensive machine work and fitting is continually increasing, and the present machine shops are often obliged to carry on such work very slowly, owing to a want of a sufficient number of proper machine tools. This is notably the case at the New York navy-yard, where it is frequently necessary to stop work in progress on fittings for ships under construction, in order to be able to do work for vessels under repair at the yard; and even when this is done, if there are a number of vessels under repair at the same time, the work upon them can not always be carried on with the celerity desirable, on account of the time it requires to finish work in the machine shops.

Although the amount of such repairs upon ships in commission will undoubtedly decrease in the future, for each particular ship, owing to a longer experience in both care and design of fittings that are now in some respects novelties, yet the total amount of such work will increase with the number of vessels, and the demands upon the machine shops of the navy-yards for repair work will probably increase for several years. Where the mechanical appliances are used to the extent and for the multifarious purposes now customary on naval vessels, such repairs can only be regarded as inevitable, especially as the naval designer is obliged to reduce the weight of all parts to as great an extent as is compatible with strength.

If, moreover, the requirements of the service in time of war are considered for a moment, the necessity of well-equipped shops for repair work becomes imperative. Consider the condition of any vessel that had been exposed to the fire of a modern man-of-war; admitting that the armor belt or protective deck had prevented any serious injury to the machinery and that part of the hull below the water line, yet the unarmored portions of the vessel would inevitably be greatly cut up by the fire from the rapid-fire guns alone, in addition to the damage done by the larger guns of the main battery. To repair the vessel in a satisfactory manner would require many of her outside plates, frames, deck beams, etc., to be replaced or patched; and to carry on such work with celerity it will be by no means sufficient to simply increase the number of men employed on the work. The additional men must have a place to work in the shops; they can not, as was possible for the shipwright in the past, bring their own tools to the work, but unless they can be furnished with the punches, shears, planers, and other machine tools required for metal-working, they can not be put at work.

This difficulty of suddenly increasing the output of the navy-yards in the present condition of their construction plants, and so hastening the simultaneous fitting out or repair of even a moderate number of mod-

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ern vessels, should any emergency require it to be done, merits the most careful consideration.

If we compare the plant available for such work at any of our navy-yards with that considered necessary in European dockyards, our yards will be found to be very deficient in the number and size of machine shops supplied with metal-working tools. Compare, for instance, the construction plant of the New York yard with that of Portsmouth dockyard, England; it will be found that the latter yard has five separate and complete plants, each comprising plate and angle furnaces, bending slabs, machine shops, etc., each quite as extensive as the entire plant at the New York yard. These shops are grouped around the various dry docks in which building and repair work is performed, so that while building or repairing the shops are not only close at hand, but they can, on account of the number of independent plants, be devoted uninterruptedly to the work to be done. At present there are two armored and three unarmored vessels, of an aggregate displacement of 44,000 tons, building at this dockyard; while at New York the *Maine*, *Puritan*, and *Terror*, all armored vessels, and the cruiser *Cincinnati*, of an aggregate displacement of 19,800 tons, are building or completing. A comparison of the amount of work being done at these two yards, with the appliances available at each of them for accomplishing it, can not but emphasize the necessity of an extension of the construction and repair plant at the New York yard.

In preparing the following estimates for the improvement of the yard plants, however, only such amounts have been asked for as are absolutely necessary for present needs; but the Bureau desires to call to the especial attention of the Department the necessity of a general increase in the extent of the machine shops under the cognizance of this Bureau if its work is to be carried on in the most economical and expeditious manner.

An appropriation of $25,000 is recommended for the navy-yard at Portsmouth, N. H., for the purchase and erection of new tools, which are required principally in the shipfitter shops.

An appropriation of $25,000 is recommended for the navy-yard at Boston, Mass., for the purchase and erection of new tools, to consist principally of machine tools for the shipfitter's shop, and an electric drilling plant for repair work in dry dock.

An appropriation of $150,000 is recommended for the navy-yard, New York, for the purchase and erection of new tools. These tools are required for handling material and for general machine work, and in addition a number of heavy tools are needed for machining protective deck plates, stem and stern posts, rudder frames, etc., and with which any slight fitting that armor plates may occasionally require can be expeditiously performed. At present any machine work to be performed upon the armor plates at the yard must be done by hand, as there are no tools suitable for the purpose available. In the case of the *Minantonomoh*, where alterations in the shape of the port-holes in turret armor plates were made to comply with new requirements of the Ordnance Bureau, the necessity of doing the work by hand, owing to the want of proper tools, entailed both great delay and expense. To place these tools properly will require a building about 75 feet wide by 200 feet long, with wall columns capable of supporting a track for an overhead traveling crane of 50 tons capacity.

A second building is required to replace the present wooden shed over plate and angle furnaces. This shed is too small for the purposes required, and as the furnaces are fired continuously there is constant

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danger of fire. It is recommended that this wooden shed be replaced by one of iron or steel, about 290 feet long by 160 feet wide, in two bays of 80 feet width each. It will then be able to contain additional bending slabs, which are much needed, together with the angle working tools, which are much crowded in the present wooden shed.

In view of the large amount of repair and fitting-out work being carried on at the New York navy-yard the Bureau wishes to urge upon the consideration of the Department the importance of the improvements recommended, as it is believed that they are absolutely essential to the prompt and economical conduct of work at that yard.

An appropriation of $44,000 is recommended for the League Island navy-yard for the purchase and erection of new tools, as recommended by the report of the board of which Naval Constructor John F. Hanscom, U. S. Navy, was senior member (see Appendix M), and which are needed to put the shops in proper condition to carry on any work that might be wanted in the general repair of a vessel and her equipment.

An appropriation of $48,000 is recommended for the Norfolk, Va., navy-yard for the purchase and erection of new tools, as recommended by Naval Constructor F. T. Bowles, U. S. Navy (see Appendix M), for the improvement of the construction machinery plant.

An appropriation of $100,000 is recommended for the Mare Island navy-yard for the purchase and erection of new tools, as recommended by Naval Constructor J. H. Linnard, U. S. Navy (see Appendiz M), in order to carry on the work at that yard more economically and promptly.

The following buildings are also required at this yard for the proper conduct of the work:

(1) A light shed to contain plate and angle furnaces and bending slabs. This shed to be about 120 feet long by 110 feet wide; the frame work of shed to be of wood, with light corrugated iron roof.

(2) A suitable building to cover the 250 horse power Corliss engine of new construction machine shop to replace the present temporary wooden shed, which is insufficient to protect the engine from the weather.

(3) A substantial open shed to serve as a shipfitter's shop; the building to be in three bays, each 150 by 50 feet, making a shed 150 feet square. At present a considerable portion of the tools already purchased for this yard are stored for lack of suitable shops and sheds, and others absolutely necessary for the work on the *Monadnock* have been temporarily erected in a part of the building which it is desired to use as a foundry.

As the only navy-yard possessed by the Government on the Pacific coast, it is of the utmost importance that the Mare Island yard should be thoroughly equipped, and the Bureau believes that the appropriation asked for is the very least with which the necessary immediate improvements can be satisfactorily undertaken.

STANDARD FITTINGS AND REPORT ON ARMOR FASTENINGS.

In connection with the subject of repairs upon ships in commission the Bureau desires to express its opinion of the importance of the adoption of standard and interchangeable fittings whenever it may be possible to do so, and to state that it is doing all in its power to accomplish this result.

This will not only reduce the first cost but enable the time taken for repairs to be considerably shortened, since by keeping in store a suffi-

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cient quantity of all standard fittings to fill current demands the time required to manufacture such articles, which is frequently very considerable owing to the necessity of making special patterns, castings, and forgings, will be eliminated, and it will be only necessary to fit and secure in place the articles in question.

The Bureau regrets that the very limited number of officers in the construction corps has not permitted it to do all that it could have wished in this direction, but it takes pleasure in referring to work of this nature already accomplished and especially in the adoption of standard types of armor bolts of the form recommended in the report of the board appointed at the request of the Bureau, and of which Naval Constructor Philip Hichborn, U. S. Navy, was president, and Prof. Philip R. Alger, Naval Constructors J. H. Linnard and J. J. Woodward, and Assistant Naval Constructor D. W. Taylor, U. S. Navy, members, a copy of which, approved by the Department, is hereto annexed. (See Appendix N.)

SHEATHING THE BOTTOMS OF STEEL VESSELS.

The importance of the preservation of the bottoms of steel vessels from corrosion and fouling can hardly be overestimated and is continually emphasized by the reports of loss of speed and increased consumption of coal received from our new unsheathed steel vessels now in commission. Unless we are willing to admit that the rôle of our cruisers in time of war shall be entirely confined to cruises of short duration in the neighborhood of our own ports it would appear that they are deficient in a most important quality, namely, the ability to maintain high speed at sea for long periods of time.

In the report of the Bureau 1889 this subject was treated at length and much valuable data furnished in the article upon "Sheathed and Unsheathed Ships," by Naval Constructor Philip Hichborn, U. S. Navy, contained in that report. The Bureau can only repeat the recommendations therein contained and which may be briefly summarized as follows:

(1) All cruising vessels intended for general service in foreign waters should be sheathed if above 1,000 tons displacement.

(2) Vessels of less than 1,000 tons displacement intended for general service as cruising gunboats, etc., should be of composite construction, viz, with steel framing, wood outside planking, and copper sheathing.

An examination of the present policy of the English admiralty regarding sheathing is interesting and fully sustains the above recommendations. During the past and present years (1890 and 1891) the keels have been laid for seven first-class and twelve second-class cruisers for the English navy. Four of the first-class cruisers, of an aggregate displacement of 30,800 tons, and all twelve of the second-class, of an aggregate displacement of 49,280 tons, are to be sheathed, while only three of the first-class, of an aggregate displacement of 22,050 tons, are to be unsheathed. Thus out of a total displacement of 102,130 tons of new construction 78 per cent are to be sheathed.

The only valid objection that has been urged against sheathing is the danger of extensive corrosion of the steel hull, should there be, on account of bad workmanship, any leak through the wood sheathing permitting galvanic action to be set up between the copper and steel. In this case it is undoubtedly true that the steel hull of the vessel will be injured and that repairs may be necessary. A number of the early sheathed ships have required extensive repairs on this account; but with careful inspection and good workmanship the danger of corrosion

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of the steel hull is entirely removed, and as an indication to what extent the danger of corrosion has been eliminated it may be stated that in the best work now done abroad, instead of the two thicknesses of planking formerly used only a single thickness of 4-inch teak planking is considered necessary to insulate the copper sheathing from the steel hull.

All of the cruising gunboats built for the English navy since 1886 are of composite construction. This enables them to be coppered, and so remain at sea for long periods of time without being docked. Vessels of this class are, in the opinion of the Bureau, particularly adapted for service in Chinese, West Indian, and South American waters on account of their shallow draft and freedom from fouling. Plans and specifications for a composite gunboat of the displacement of the *Petrel* were prepared by the Bureau at the time the design of that vessel was under consideration, and they are now in the possession of the Bureau.

PROGRESSIVE SPEED TRIALS.

The Bureau urgently recommends that progressive speed trials, covering as great a range of speeds as possible, may be made with each new vessel of the Navy, at as early a date as convenient after her final acceptance by the Government. The speed curves thus obtained should be supplemented by turning trials whenever the vessel can be spared for a sufficient time to have them made; but in no cases should the progressive speed trials be omitted, as the data so obtained is essential for the information of the Bureau in the preparation of new designs.

EXPERIMENTAL TANK.

The Bureau recommends the immediate construction of an experimental tank, for use in determining the resistance of ships by means of models. In preparing the designs of new vessels of novel types, the want of such apparatus has been greatly felt in the past, and with the high speeds now so generally used its importance is constantly increasing.

Mr. William Denny, one of the most progressive and well-informed Scotch shipbuilders, in a letter written in 1887 relative to the importance of the assistance that an experimental tank may render to the naval designer, expresses himself as follows:

"The truth is that of all the problems about a steamship the only one at the present moment incapable of being solved by *a priori* methods in extreme cases is that of the speed and power. *No ability and no training will enable even the most skillful naval architect to overcome the want of an experimental tank in coping with these questions.* My partners are so firmly convinced of the value of the tank that every one of them regards the large amount of money sunk in it in the form of a capital, and the large amount still to be sunk in it, as one of our best investments, and have met without grudging the annual outlay required for its administration."

Since this was written the English Admiralty, who already had an experimental tank at Torquay, have built a new and improved tank at Portsmouth; and their example has been followed by both Italy and Austria. At the present time experimental works of this kind are an essential part of all foreign naval administrations under which the general designs of new types of vessels are being understandingly prepared; for the tank is even of more use than for the purpose of predicting the speed and power of new types of steamers; it has an equally high value in enabling us to obtain more accurate efficiencies of engines

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and propellers, and to check and explain discrepancies in trials which would otherwise remain obscure.

In conclusion, the Bureau would say that it is of the opinion that the establishment of the experimental tank in question could not fail to be of the greatest benefit not only to the naval service, but also to the whole shipbuilding interests of the country; and to this end it is recommended that the necessary authority be obtained from Congress to allow experiments to be performed for American shipbuilders and designers and such other persons as may be designated by the Department, upon the express condition that such work shall not interfere with any work being performed for the naval service, and also that the expenses of such experiments, in every respect, shall be paid by the person at whose request the work is done.

The estimated cost of the complete construction and installation of the tank, including building and purchase of all necessary apparatus, is $85,000.

In conclusion, the Bureau desires to express its satisfaction with the progress of the work of building up a navy suited to the needs of the United States. When the vessels now under construction are completed, the country will possess the nucleus of a modern fleet, complete in all of its types, from the most powerful armored battle ships to sea-going torpedo boats. These vessels, designed with special reference to the needs of our own naval service, and to fulfill requirements of construction as severe as those of any nation in the world, will be, ship for ship, superior to most, and second to none, of the vessels of any foreign fleet now built or building. It only remains for Congress to decide what number of each class are necessary for the protection of the country.

Much of the value of a fleet of modern steel ships will, however, depend upon their being kept continually in a state of thorough repair. The experience of the past few years, both at home and abroad, tends to show that there is, even in time of peace, under the conditions of ordinary cruising, no inconsiderable amount of work necessary to be done to maintain these vessels in a satisfactory condition. During any period of emergency when it becomes necessary to suddenly mobilize all available ships, or to expeditiously repair a number of vessels that have been injured in action, the amount of work thrown upon the navy-yards will be immensely increased. With their present plants the yards will not be able to carry on the ordinary repair work of the new steel fleet with the rapidity to be desired, and any emergency will find them inadequate to perform the work required.

While the work of new construction can be advantageously performed in private shipbuilding yards, each one of which would become a construction yard for building new ships in time of war, and so be a most valuable aid to the Government, yet the work of repairing and fitting out ships must be done at the navy-yards, since there only can be found united the various departments whose several services are needed to fit a ship out for sea, and the depots of necessary military supplies.

As our fleet has changed from the wooden steamers of a few years ago, whose construction required appliances differing but slightly from those required for building the sailing ships which had preceded them to the steel twin or triple screw ships of to-day, that are practically without sail power, and that must be regarded more than ever as fighting machines on account of the continually increasing number of

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mechanical appliances with which they are necessarily filled, a corresponding change in the nature of the work to be done in our navy-yards is taking place. It is a natural consequence of that which the ships have undergone, and to be properly met requires as important improvements in the yard plants as have taken place in the ships themselves.

The Bureau desires to call these facts to the especial attention of the Department, as it is of the opinion that they merit the most careful consideration.

I am, sir, very respectfully,

THEODORE D. WILSON,
Chief Constructor, U. S. N.,
Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Construction and Repair, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for current fiscal year ending June 30, 1892.
A. *Salaries.*			
Chief clerk (appropriated, act March 3, 1891)	$1,800.00		
1 draftsman (appropriated, same act)	1,800.00		
1 assistant draftsman (appropriated, same act)	1,600.00		
1 assistant draftsman (appropriated, same act)	1,400.00		
1 clerk of class four (appropriated, same act)	1,800.00		
1 clerk of class three (appropriated, same act)	1,600.00		
1 clerk of class two (appropriated, same act)	1,400.00		
1 clerk of class one (appropriated, same act)	1,200.00		
1 assistant messenger (appropriated, same act)	720.00		
1 laborer (appropriated, same act)	660.00		
		$13,980.00	$13,980.00
B. *Construction and repair of vessels.*			
Preservation and completion of vessels on the stocks and in ordinary; purchase of materials and stores of all kinds; for steam steerers, pneumatic steerers, steam capstans, steam windlasses, and other steam auxiliaries; labor in navy-yards and on foreign stations; purchase of machinery and tools for use in shops; wear, tear, and repair of vessels afloat, and for general care, increase, and protection of the Navy in the line of construction and repair; incidental expenses, such as advertising, freight, foreign postage, telegrams, telephone service, photographing, books, professional magazines, plans, stationery, and instruments for drafting room (appropriated)	1,000,000.00	1,000,000.00	1,000,000.00
C. *Civil establishment.*			
At navy-yard, Portsmouth, N. H.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
At navy-yard, Boston, Mass.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, New York, N. Y.:			
One clerk to naval constructor (appropriated)	1,400.00		
Three writers, at $1,017.25 each (appropriated)	3,051.75		
At navy-yard, League Island, Pa.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, Washington, D. C.:			
One clerk to naval constructor (appropriated)	1,400.00		
At navy-yard, Norfolk, Va.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
At navy-yard, Pensacola, Fla.:			
One writer, at $1,017.25 (appropriated)	1,017.25		
At navy-yard, Mare Island, Cal.:			
One clerk to naval constructor (appropriated)	1,400.00		
Two writers, at $1,017.25 each (appropriated)	2,034.50		
		19,972.50	19,972.50
D. *Increase of the Navy—Construction and machinery.*			
On account of the hulls and outfits of vessels heretofore authorized by Congress. On account of steam machinery of vessels heretofore authorized by Congress. Appropriated act March 3, 1891	7,384,605.00	7,384,605.00	

NAVY DEPARTMENT,
BUREAU OF CONSTRUCTION AND REPAIR,
Washington, D. C., October 6, 1891.

SIR: We have the honor to submit the following joint estimates of the amount which will be required under appropriation, "Increase of the Navy, construction and machinery," to carry on the work on new vessels authorized by Congress to July 1, 1893, as per statements herewith, viz:

Under Bureau of Construction and Repair:

For fiscal year ending June 30, 1892	$8,018,058.00
For fiscal year ending June 30, 1893	6,156,687.00
Total	$14,174,745.00

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Estimates of appropriations required for the service of the fiscal year, etc.—Continued.

Detailed objects of expenditure, and explanations.			Estimated amount required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for current fiscal year ending June 30, 1892.
D. *Increase of the Navy—Construction and machinery*—Continued.					
Under Bureau of Steam Engineering:					
For fiscal year ending June 30, 1892	$4,582,128.00				
For fiscal year ending June 30, 1893	3,768,715.00				
Total		$8,350,843.00			
Aggregate		22,525,588.00			
Deducting balances of appropriations in the Treasury July 1, 1891, as per statement this day received from Bureau of Provisions and Clothing, as follows:					
Vessels and monitors, act Aug. 3, 1886	116,770.28				
Increase of the Navy, monitors and vessels, acts Mar. 3, 1885, and Aug. 3, 1886	219,417.49				
Increase of the Navy, vessels for coast and harbor defense.	47,385.17				
Increase of the Navy, construction and machinery, balance.	2,441,003.06				
Increase of the Navy, construction and machinery, act Mar. 2, 1891	12,107,000.00				
Total	14,931,576.00				
Material in store available for use	442,100.00				
Total	15,373,676.00				
Less amounts required to pay the following reservations, etc., due and not paid July 1: Bureaus Construction and Repair, Steam Engineering and Equipment:					
Reservation, "Philadelphia"	$25,000				
Reservation, "Newark"	42,485				
Reservation, "Bennington"	25,000				
Reservation, "Concord"	24,000				
Changes and expenses, "Concord"	2,557				
Changes and expenses, "Bennington"	32,298				
Changes and expenses, "Newark"	25,919				
Pneumatic system, "Terror"	11,484				
Electric lighting plants, "Miantonomoh," "Monadnock" "Terror"	43,950				
Total deductions	232,693.00	15,140,983.00			
Leaves a balance of		7,384,605.00			

as the estimated amount required to be appropriated for the fiscal year 1892–'93 to carry the work on these vessels to June 30, 1893.

Very respectfully,

T. D. WILSON,
Chief Constructor, U. S. Navy,
Chief of Bureau of Construction and Repair.

GEO. W. MELVILLE,
Engineer-in-Chief, U. S. Navy,
Chief of Bureau of Steam Engineering.

Hon. B. F. TRACY, *Secretary of the Navy.*

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APPENDIX E.

Statement showing vessels repaired at the several navy-yards and cost of repairs during the fiscal year 1890-1891.

Name of vessel.	Amount.	Name of vessel.	Amount.
Adams	$1,169.75	Monterey (tug)	$117.36
Alarm	5,276.18	Nahant	1,432.78
Alert	16,006.06	Nantucket	620.07
Atlanta	13,539.56	Nina	5,091.89
Baltimore	714.75	Nipsic	1,348.18
Boston	24,698.71	Omaha	144.54
Brooklyn	2,571.71	Ossipee	2,603.15
Camanche	2,932.64	Pensacola	14,641.89
Catalpa	287.28	Petrel	3,617.30
Charleston	16,545.94	Philadelphia	6,782.50
Chicago	33,489.26	Portsmouth	225.19
Constellation	7,145.56	Richmond	6,724.52
Cushing	1,557.11	Speedwell	97.81
Despatch	652.61	Standish	9,539.24
Dolphin	12,744.30	Swatara	617.33
Enterprise	5,040.11	Thetis	13,647.62
Essex	163.71	Triana	4,110.10
Fortune	4,345.44	Vermont	2,302.05
Franklin	2,564.72	Vesuvius	5,135.84
Galena	2,467.29	Wabash	719.16
Independence	3,519.16	Yantic	8,608.85
Jamestown	1,632.22	Yorktown	14,072.14
Jason	1,392.34		
Kearsarge	2,088.48	Total	464,880.86
Lancaster	68,478.65	Amount paid to the Boston Tow boat Co.. for floating Galena and Nina, and work on the Triana, which were wrecked at Gay Head, March 14, 1891	25,234.50
Leyden	1,174.53		
Marion	68,501.82		
Mayflower	1,425.16		
Minnesota	20,365.11		
Mohican	6,117.38	Total	490,115.36
Monongahela	34,173.81		

Vessels remaining under repairs June 30, 1891.

Navy-yard.	Name of vessel.	Navy-yard.	Name of vessel.
Kittery	Kearsarge.	Mare Island	Alert.
Norfolk	Chicago.	do	Marion.
Do.	Dolphin.		

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APPENDIX F.

Amounts expended under the different appropriations during the fiscal year 1890–'91.

CONSTRUCTION AND REPAIR.

Amount appropriated		$1,000,000.00
Expended:		
For labor at navy-yards and stations	$745,679.70	
For purchase of materials, tools for yards, advertising, foreign postage, telegrams, instruments for drafting rooms, etc	163,353.48	
Account of foreign stations	17,618.68	
Account of transfers	7,409.65	
		934,061.51
Balance on hand July 1, 1891		65,938.49

N. B.—This balance is required to pay the indebtedness of the Bureau.

CIVIL ESTABLISHMENT.

Amount appropriated	19,972.50
Expended for clerks and writers at navy-yards	19,247.60
Balance on hand July 1, 1891	724.90

INCREASE OF THE NAVY.

Construction and machinery, acts of September 7, 1888, and March 2, 1889: Expended during the year	2,043,849.72
Vessels for coast and harbor defense, act of March 3, 1887: Expended during the year	14,434.33
Monitors and vessels, acts of March 3, 1885, and August 3, 1886: Expended during the year	80,998.08
Vessels and monitors, act of August 3, 1886: Expended during the year	9,470.31
Steel practice vessel, act of September 7, 1888: Expended during the year	6,664.12
Steam tugs: Purchase or construction of four steam tugs, act of March 2, 1889: Expended during the year	363.82

IMPROVEMENT OF PLANTS AT THE DIFFERENT NAVY-YARDS.

Expended during the year:	
Navy-yard, Portsmouth, N. H	12,618.97
Navy-yard, Boston, Mass	17,123.95
Navy-yard, Brooklyn, N. Y	41,427.87
Navy-yard, League Island, Pa	4,031.49
Navy-yard, Norfolk, Va	62,609.94
Navy-yard, Mare Island, Cal	45,128.03

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APPENDIX G.

Amounts expended on new vessels at several navy-yards, including outfit of other vessels building under contract, and amounts expended for draftsmen, etc., during the fiscal year 1890 to 1891.

Name of vessel.	Expended on construction of hull, labor, and material.	Expended for masts, spars, boats, and other outfits.	Expended for draftsmen, writers, copyists, model-makers, etc.	Total.
Newark	$4,166.43	$39,596.09	$10,759.32	$54,521.84
Baltimore			2,735.73	2,735.73
Maine	408,177.00	454.24	12,309.75	420,940.99
Texas	412,254.05	132.92	10,376.85	422,763.82
Philadelphia	12,404.34	17,830.24	6,164.65	36,399.23
San Francisco	55,619.72	51,089.97	3,383.44	110,093.13
Concord	7,419.44	5,211.97	5,299.99	17,931.40
Bennington	2,243.48	8,520.64	4,391.73	15,164.85
New York			13,667.85	13,667.85
Cruiser No. 6			11,027.14	11,027.14
Cincinnati	220,022.34		6,220.88	226,243.22
Raleigh	246,384.84	379.63	9,582.50	256,346.97
Cruiser No. 9		7,630.11	5,248.89	12,879.00
Cruiser No. 10		4,321.71	5,181.88	9,503.59
Cruiser No. 11		1,068.41	7,045.39	8,113.80
Gunboat No. 5		1,505.83	2,159.23	3,665.06
Gunboat No. 6		760.43	2,156.19	2,916.62
Ram for harbor defense			3,633.10	3,633.10
Monterey			13,735.11	13,735.11
Steel practice vessel		1,109.36	3,033.96	4,143.32
Three new steam tugs			420.07	420.07
Indiana			5,562.21	5,562.21
Massachusetts			5,510.43	5,510.43
Oregon			5,671.11	5,671.11
Cruiser No. 12	53.29		9,350.27	9,403.56
Torpedo cruiser			5,774.12	5,774.12
Cruiser No. 13			2,129.43	2,129.43
Total	1,368,744.93	139,620.55	172,531.22	1,680,896.70

Name of vessel.	Expended in completion of hull of monitors, labor, and material.	Expended for masts, spars, boats, and other outfits.	Expended for draftsmen, writers, copyists, model-makers, etc.	Total.
Puritan	$57,194.33	$15,895.63	$2,010.81	$75,100.77
Monadnock	80,672.58		4,732.66	85,405.24
Terror	122,336.29	3,588.71	6,738.88	132,663.88
Amphitrite	94,767.80	446.94	3,945.72	99,160.46
Miantonomah	72,171.98	5,396.01	3,896.50	81,464.49
Total	427,142.98	25,327.29	21,324.57	473,794.84

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APPENDIX H.

Payments made on account of vessels building under contract under appropriation "Increase of the Navy" to and including October 1, 1891, together with balance due.

Name of vessel.	Contract price.	Payments. No.	Payments. Amount.	Reservations retained.	Penalties retained.	Balance due.
Newark	$1,248,000.00	10	$1,199,450.00	$42,500.00	$6,050.00	$42,500.00
Vesuvius	350,000.00	10	310,028.65	*271.35	39,700.00	.....
Philadelphia	1,350,000.00	10	1,302,051.06	†25,000.00 *3,848.94	†19,100.00	25,000.00
San Francisco	1,428,000.00	10	1,423,231.50	*1,068.00	3,700.00	.....
Concord	490,000.00	10	462,750.00	24,000.00	3,250.00	24,000.00
Bennington	490,000.00	10	459,096.50	25,553.50	5,350.00	25,000.00
Monterey	1,628,950.00	8	1,172,844.00	130,316.00	.....	456,106.00
Cruiser No. 9	612,500.00	14	385,875.00	42,875.00	.....	226,625.00
Cruiser No. 10	612,500.00	14	385,875.00	42,875.00	.....	226,625.00
Cruiser No. 11	674,000.00	11	333,630.00	37,070.00	.....	340,370.00
New York	2,985,000.00	19	1,701,450.00	189,050.00	.....	1,283,550.00
Gunboat No. 5	318,500.00	11	157,657.50	17,517.50	.....	160,842.50
Gunboat No. 6	318,500.00	11	157,657.50	17,517.50	.....	160,842.50
Protected cruiser No. 6	1,796,000.00	9	484,920.00	53,880.01	.....	1,796,000.00
Steel practice vessel	250,000.00	10	112,500.00	12,500.00	.....	250,000.00
Protected cruiser No. 12	2,725,000.00	11	899,250.00	99,916.63	.....	1,825,250.00
Steam tug No. 1	32,438.00	3	17,516.52	1,946.52	.....	14,921.48
Steam tug No. 2	32,438.00	3	17,516.52	1,946.52	.....	14,921.48
Steam tug No. 3	32,438.00	3	17,516.52	1,946.52	.....	14,921.48
Indiana	3,063,000.00	3	275,670.00	30,630.00	.....	2,787,330.00
Massachusetts	3,063,000.00	2	183,780.00	20,420.00	.....	2,879,220.00
Oregon	3,222,810.00	1	96,684.30	10,742.70	.....	3,126,125.70
Harbor defense ram	930,000.00	1	41,850.00	4,650.00	.....	888,150.00

*Work omitted. †Special reservation.

Remarks.—In addition to contract price there was paid—

Newark:	
For premiums	$36,857.70
For trial-trip expenses	16,327.64
For extra work, Bureau of Construction and Repair	34,320.11
For extra work, Bureau of Steam Engineering	4,199.21
	91,704.66
Vesuvius:	
For trial-trip expenses	2,669.89
Philadelphia:	
For premiums	100,000.00
For extra work, Bureau of Construction and Repair	24,784.00
For extra work, Bureau of Steam Engineering	2,563.93
For trial-trip expenses	17,427.62
	144,777.88
San Francisco:	
For premiums	100,000.00
For extra work, Bureau of Construction and Repair	40,412.00
For extra work, Bureau of Steam Engineering	7,327.94
For trial-trip expenses	25,446.32
	173,186.26
Concord:	
For extra work, Bureau of Construction and Repair	22,557.26
For extra work, Bureau of Steam Engineering	2,085.46
For trial-trip expenses	8,366.34
	33,009.06
Bennington:	
For extra work, Bureau of Construction and Repair	21,471.94
For extra work, Bureau of Steam Engineering	2,085.46
For trial-trip expenses	6,940.64
	30,498.04

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APPENDIX I.—*Table of*

ARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load water line.	Breadth.	Mean draft.		
					Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*	
Puritan.....	Iron low freeboard coast-defense monitor. Two steel barbette turrets.	1875	John Roach, Chester, Pa.	In course of completion at U. S. navy-yard, Brooklyn, N. Y.	289 6	60 1½	18 0	6,060	3,700
Miantonomoh.	Iron low freeboard coast-defense monitor. Two compound armor turrets.	1874	....do	Ready for commission.	259 6	55 10	14 6	3,990	1,436
Amphitrite...	Iron low freeboard coast-defense monitor. Two steel barbette turrets.	1874	Harlan & Hollingsworth, Wilmington, Del.	In course of completion at U. S. navy-yard, Norfolk, Va.	259 6	55 10	14 6	3,990	1,600
Monadnock...	....do	1874	U. S. navy-yard, Mare Island, Cal.	In course of completion.	259 6	55 10	14 6	3,990	3,000
Terror.....	Iron low freeboard coast-defense monitor. Two steel turrets.	1874	Wm. Cramp & Sons, Philadelphia, Pa.	In course of completion at U. S. navy-yard, Brooklyn, N. Y.	259 6	55 10	14 6	3,990	1,600
Texas	Steel, armored battleship. Two steel turrets.	1889	U. S. navy-yard, Norfolk, Va.	Building..	301 4	64 1	22 6	6,300	8,600
Maine	Steel armored cruiser. Two steel barbette turrets.	1889	U. S. navy-yard, Brooklyn, N. Y.	....do	318 0	57 0	21 6	6,648	9,000
Monterey.....	Steel low freeboard coast defense. Two steel barbette turrets.	1889	Union Iron Works, San Francisco, Cal.	....do	256 0	59 0	14 10	4,138	5,400
New York	Steel armored cruiser. Two steel barbette turrets.	1890	Wm. Cramp & Sons, Philadelphia, Pa.	....do	380 6½	64 10	23 3½	8,150	16,500
No. 1.....	Steel harbor-defense ram.	1891	Bath Iron Works, Bath, Me.	....do	250 9	43 5	15 0	2,183	4,800
Massachusetts	Steel coast-line battle ship. 2 13″ barbette turrets. 4 8″ barbette turrets.	1891	Wm. Cramp & Sons, Philadelphia, Pa.	....do	348 0	69 3	24 0	10,200	9,000
Indiana.....	....do	1891	....do	....do	348 0	69 3	24 0	10,200	9,000
Oregon	....do	1891	Union Iron Works, San Francisco, Cal.	....do	348 0	69 3	24 0	10,200	9,000

*Limit.

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vessels of the U. S. Navy.

VESSELS.

Type of engine.	Speed in knots per hour.	Batteries. Main.	Batteries. Secondary.	Armor. Sides.	Armor. Turrets.	Armor. Barbettes.	Cost of hull and machinery.	Date of act authorizing building or completion.
				Ins.	*Inches.*	*Inches.*		
Twin screw horizontal compound.	12.4	4 12" B. L. R. 6 4" R. F. guns.	2 6-pdr. R. F .. 4 3-pdr. R. F. 4 37mm H. R. C. 4 Gatlings.	14	8	14	Appropriation to complete, $3,178,046.	Mar. 3, 1885; Aug. 3, 1886; Mar. 3, 1887.
Twin screw inclined compound.	10.5	4 10" B. L. R.	2 6-pdr. R. F .. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	7	11½	.....		Do.
....do.....	13	4 10" B. L. R. 2 4" R. F. guns.	2 6-pdr. R. F .. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	9	7½	11½		Do.
Twin screw horizontal triple expansion.	14.5	4 10" B. L. R. 2 4" R. F guns.	2 6-pdr. R. F .. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatling.	9	7½	11½		Do.
Twin screw inclined compound.	12	4 10" B. L. R.	2 6-pdr. R. F .. 2 3-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	7	11½	.....		Do.
Twin screw vertical triple expansion.	17	2 12" B. L. R.. 6 6" B. L. R.	12 6-pdr. R. F . 4 1-pdr. R. F. 4 37mm H. R. C. 2 Gatlings.	12	12	.....	*2,500.000	Aug. 3, 1886.
....do.....	17	4 10" B. L. R.. 6 6" B. L. R.	12 6-pdr. R. F . 6 1-pdr. R. F. 4 Gatlings.	12	8	12	*2,500,000	Mar. 3, 1887.
....do.....	16	2 12" B. L. R.. 2 10" B. L. R.	6 6-pdr. R. F... 4 1-pdr. R. F. 2 Gatlings.	13	For'd 8". Aft 7½".	For'd 14". Aft 11½".	†1,628,950	Mar. 3, 1887.
....do.....	20	6 8" B. L. R... 12 4" R. F. guns.	8 6-pdr. R. F .. 4 1-pdr. R. F. 4 Gatlings.	4	7	10	†2,985,000	Sept. 7, 1888.
....do.....	17	.....	4 6-pdr. R. F.	6	.....	.....	†930,000	Mar. 2, 1889.
....do.....	15	4 13" B. L. R.. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F.. 4 6-pdr. R. F. 4 Gatlings.	18	17, 8½, 6.	17, 10, 8.	†3,020,000	June 30, 1890.
....do.....	15	4 13" B. L. R.. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F.. 4 1-pdr. R. F. 4 Gatlings.	18	....do	....do	†3,020,000	Do.
....do.....	15	4 13" B. L. R.. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F.. 4 1-pdr. R. F. 4 Gatlings.	18	....do	....do	†3,180,000	Do.

†Contract price.

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APPENDIX I.—*Tables of vessels*

SINGLE TURRET MON

Name.	Type.	Keel laid.	By whom and where built.	Condition.	Dimensions.			Displacement.	Indicated horse power.
					Length between perpendiculars.	Breadth.	Mean draft.		
					Feet.	*Ft. In.*	*Ft. In.*	*Tons.*	
Ajax	Low free board single-turret monitor.	1862	Snowden & Mason, Pittsburg, Pa.	In ordinary, near Richmond.	225	43 8	13 6	2,100	340
Comanche	do	1862	Donohue, Ryan & Secor, Jersey City, N. J.	In ordinary, Mare Island, Cal.	200	46 0	11 6	1,875	340
Canonicus	do	1862	Harrison Loring, Boston, Mass.	In ordinary, near Richmond.	225	43 8	13 6	2,100	340
Catskill	do	1862	John Ericsson, Brooklyn, N. Y.	do	200	46 0	11 6	1,875	340
Jason	do	1862	John Ericsson, Chester, Pa.	In ordinary, League Island, Pa.	200	46 0	11 6	1,875	340
Lehigh	do	1862	do	In ordinary, near Richmond.	200	46 0	11 6	1,875	340
Mahopac	do	1862	Z. and F. Secor, Jersey City, N. J.	do	225	43 8	13 6	2,100	340
Manhattan	do	1862	Perine, Secor & Co., Jersey City, N. J.	do	225	43 8	13 6	2,100	340
Montauk	do	1862	John Ericsson, Brooklyn, N. Y.	In ordinary, League Island, Pa.	200	46 0	11 6	1,875	340
Nahant	do	1862	Harrison Loring, Boston, Mass.	do	200	46 0	11 6	1,875	340
Nantucket	do	1862	Atlantic Works, Boston, Mass.	In ordinary, Brooklyn.	200	46 0	11 6	1,875	340
Passaic	do	1862	John Ericsson, Brooklyn, N. Y.	Naval Academy.	200	46 0	11 6	1,875	340
Wyandotte	do	1862	Miles Greenwood, Cincinnati, Ohio.	In ordinary, near Richmond.	225	43 8	13 6	2,100	340

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of the U. S. Navy—Continued

ITORS (IRON).

Type of engine.	Speed in knots.	Batteries.		Armor.		Cost of hull and machinery.	Date of act authorizing building.
		Main.	Secondary.	Sides.	Turret.		
				Ins.	*Ins.*		
Single screw grasshopper.	5 to 6	2 XV" S. B....	None	5	10	$626,582.24	April 17, 1862
.....do	5 to 6	None	....do	5	11	613,164.98	Do.
.....do	6	2 XV" S. B....	2 12-pdr. H.	5	10	622,963.22	Do.
.....do	6	....do	None	5	11	427,766.78	Do.
.....do	5 to 6	....do	....do	5	11	422,766.73	Do.
.....do	5 to 6	....do	....do	5	11	422,726.28	Do.
.....do	6	....do	....do	5	10	635,374.55	Do.
.....do	6	....do	....do	5	10	628,879.27	Do.
.....do	5 to 6	....do	....do	5	11	423,027.49	Do.
.....do	5 to 6	....do	....do	5	11	413,515.14	Do.
.....do	5 to 7	....do	....do	5	11	408,091.37	Do.
.....do	5 to 6	....do	1 12-pdr. H.	5	11	423,171.69	Do.
.....do	6	....do	....do	5	10	633,327.84	Do.

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APPENDIX I.—*Table of vessels*

UNARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load water line.	Extreme breadth.	Mean draft.		
					Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*	
Chicago	Protected cruiser.	1883	John Roach & Sons, Chester, Pa.	Flag ship Squadron of Evolution.	325 0	48 2	19 0	4,500	5,084
Boston	....do	1883	....do	North Atlantic station.	270 3	42 0	17 0	3,189	4,030
Atlanta	....do	1883	....do	Squadron of Evolution.	270 3	42 0	17 0	3,189	4,030
Dolphin	Dispatch boat.	1883	....do	Repairing at Norfolk navy-yard, Va.	240 0	32 0	14 3	1,485	2,240
Newark	Protected cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Squadron of Evolution.	310 0	49 2	18 9	4,083	8,889
Charleston	....do	1887	Union Iron Works, San Francisco, Cal.	Flag ship, Asiatic station.	312 0	46 0	19 7	4,040	6,666
Baltimore	....do	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Pacific station.	327 6	48 6	20 6	4,600	10,064
San Francisco	....do	1888	Union Iron Works, San Francisco Cal.	....do	310 0	49 2	18 9	4,083	10,480
Philadelphia	....do	1888	Wm. Cramp & Sons, Philadelphia, Pa.	Flagship, North Atlantic station.	327 6	48 6	19 2½	4,324	8,315
Cruiser No. 6	....do	1890	Union Iron Works, San Francisco, Cal.	Building	340 0	53 0	21 6	5,500	13,500
Cincinnati	....do	1890	U. S. navy-yard, Brooklyn, N. Y.	....do	300 0	42 0	18 0	3,183	10,000
Raleigh	....do	1889	U. S. navy-yard, Norfolk, Va.	....do	300 0	42 0	18 0	3,183	10,000
Cruiser No. 9	Cruiser	1890	Columbia Iron Works, Baltimore, Md.	....do	257 0	37 0	14 6	2,000	5,400
Cruiser No. 10	....do	1890	....do	....do	257 0	37 0	14 6	2,000	5,400
Cruiser No. 11	....do	1890	City Point Works, Boston, Mass.	....do	257 0	37 0	14 6	2,000	5,400

*Contract price.

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of the U. S. Navy—Continued.

STEEL VESSELS.

Type of engine.	Speed in knots per hour.	Batteries. Main.	Batteries. Secondary.	Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
							Mos.
Twin screw compound overhead beam.	15.33	4 8″ B. L. R. 8 6″ B. L. R. 2 5″ B. L. R.	2 6-pdr. R. F. 2 1-pdr. R. F. 4 47mm H. R. C. 2 37mm H. R. C. 2 Gatlings.	*$889,000	Mar. 3, 1883	July 26, 1883	.....
Single screw horizontal compound.	15.60	6 6″ B. L. R. 2 8″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 2 47mm H. R. C. 2 37mm H. R. C. 2 Gatlings.	*619,000	....do	....do	.....
....do	15.60	6 6″ B. L. R. 2 8″ B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 2 47mm H. R. C. 2 37mm H. R. C. 2 Gatlings.	*617,000	....do	....do	.....
Single screw vertical compound.	15.50	2 4″ R.F.guns	2 6-pdr. R. F. 4 47mm H. R. C. 2 Gatlings.	*315,000	....do	....do	.....
Twin screw horizontal triple expansion.	19.00	12 6″ B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37mm H. R. C. 4 Gatlings.	*1,248,000	Mar. 3, 1885	Oct. 27, 1887	24
Twin screw horizontal compound.	18.20	2 8″ B. L. R. 6 6″ B. L. R.	4 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37mm H. R. C. 2 Gatlings.	*1,017,000	....do	Dec. 28, 1886	18
Twin screw horizontal triple expansion.	19.575	4 8″ B. L. R. 6 6″ B. L. R.	4 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37mm H. R. C. 2 Gatlings.	*1,325,000	Aug. 3, 1886.	Dec. 17, 1886	18
....do	20.17	12 6″ B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37mm H. R. C. 4 Gatlings.	*1,428,000	Mar. 3, 1887.	Oct. 26, 1887	24
....do	19.678	12 6″ B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37mm H. R. C. 4 Gatlings.	*1,325,000	....do	Oct. 27, 1887	24
Twin screw vertical triple expansion.	20.00	10 5″ R. F. guns 4 8″ B. L. R.	14 6-pdr. R. F. 6 1-pdr. R. F. 4 Gatlings.	*1,796,000	Sept. 7, 1888.	July 10, 1890	April 1, 1893
....do	19.00	10 5″ R. F. guns 1 6″ R. F. guns	8 6-pdr. R. F. 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	....do	.....	.....
....do	19.00	10 5″ R. F. guns 1 6″ R. F. guns	8 6-pdr. R. F. 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	....do	.....	.....
....do	17.00	8 5″ R. F. guns 2 6″ R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*612,500	....do	Nov. 2, 1889	30
....do	17.00	8 5″ R. F. guns 2 6″ R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*612,500	....do	....do	30
....do	17.00	8 5″ R. F. guns 2 6″ R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*674,000	....do	Nov. 11, 1889	30

†Limit

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APPENDIX I.—*Table of vessels of*

UNARMORED STEEL

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse power.
					Length on low-water line.	Breadth.	Mean draft.		
					Ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*	
Cruiser No. 12...	Protected cruiser.	1890	Wm. Cramp & Sons, Philadelphia, Pa.	Building.....	412 0	58 0	22 6½	7,350	21,000
Cruiser No. 13...	....do	....	....do	....do	412 0	58 0	22 6½	7,350	21,000
GUNBOATS.									
Yorktown	Gunboat..	1887	....do	Pacific squadron.	230 0	36 0	14 0	1,700	3,660
Concord	....do	1888	N. F. Palmer & Co., Chester, Pa.	North Atlantic squadron.	230 0	36 0	14 0	1,700	3,405
Bennington.....	....do	1888	....do	Squadron of Evolution.	230 0	36 0	14 0	1,700	3,436
Petrel	....do	1887	Columbian Iron Works, Baltimore, Md.	Asiatic squadron.	176 3	31 0	11 7	890	1,513
No. 5.....	....do	1891	Bath Iron Works, Bath, Me.	Building.....	190 0	32 0	12 0	1,050	1,600
No. 6.....	....do	1891	....do	....do	190 0	32 0	12 0	1,050	1,600 *
SPECIAL CLASS.									
Practice cruiser	For naval cadets.	1891	Moore & Sons Elizabethport N. J.	Building.....	187 6	32 0	11 6	838	1,300
Vesuvius	Dynamite cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Squadron of Evolution.	251 9	26 5	10 7½	930	3,794.86
Dynamite cruiser No. 2.	.....	....	.....	Subject to orders from the Department.	.....	.....	.....	.....	.....
Torpedo cruiser	.....	....	.....	....do	.....	.....	.....	.....	.....
TORPEDO BOATS.									
Stiletto	Wood torpedo boat	....	Purchased from Herreschoff M'f'g Co.	Torpedo practice, Newport, R. I.	88 6	11 0	3 0	31	350
Cushing	Steel torpedo boat.	1889	Herreschoff M'f'g Co, Bristol, R. I.	Special service.	138 9	14 10	5 3	116	1,720
Torpedo boat No 2.	...do	....	Iowa Iron Works, Dubuque, Iowa.	Building.....	150 0	15 6	4 9	120	1,800

* Contract price.

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the U. S. Navy—Continued.

VESSELS—Continued.

Type of engine.	Speed in knots per hour.	Batteries. Main.	Batteries. Secondary.	Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
							Mos.
Triple screw vertical triple expansion.	21	1 8″ B. L. R... 2 6″ R. F. guns 8 4″ R. F. guns	12 6-pdr. R. F.. 4 1-pdr. R. F. 4 Gatlings.	*$2,725,000	June 30, 1890	Nov. 19, 1890	30
....do	21	1 8″ B. L. R... 2 6″ R. F. guns 8 4″ R. F. guns	12 6-pdr. R. F.. 4 1-pdr. R. F. 4 Gatlings.	*2, 690, 000	Mar. 2, 1891	Aug. 31, 1891	24
Twin screw horizontal triple expansion.	16. 65	6 6″ B. L. R...	2 6-pdr. R. F... 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	*455, 000	Mar. 3, 1885	Jan. 31, 1887	12
....do	16. 8	6 6″ B. L. R...	2 6-pdr. R. F... 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	*490, 000	Mar. 3, 1887	Nov. 15, 1887	18
....do	17. 5	6 6″ B. L. R...	2 6-pdr. R. F... 2 3-pdr. R. F. 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	*490, 000	....do	....do	18
Single screw horizontal compound.	11. 55	4 6″ B. L. R...	2 3-pdr. R. F... 1 1-pdr. R. F. 2 37mm H. R. C. 2 Gatlings.	*247, 000	Mar. 3, 1885	Dec. 22, 1886	12
Twin screw vertical triple expansion	14	8 4″ R. F. guns	4 6-pdr. R. F... 2 1-pdr. R. F. 2 Gatlings.	*318, 000	Mar. 2, 1889	Apr. 12, 1890	24
....do	14	8 4″ R. F. guns	4 6-pdr. R. F... 2 1-pdr. R. F. 2 Gatlings.	*318, 000	....do	....do	24
Twin screw vertical triple expansion.	13	4 4″ R. F. guns	3 6-pdr. R. F .. 2 3-pdr. R. F. 1 1-pdr. R. F. 1 37mm H. R. C. 1 Gatling.	*250, 000	Sept. 7, 1888	July 18, 1890	24
Twin screw vertical triple expansion.	21. 5	3 dynamite guns, 15″ cal.	3 3-pdr. R. F...	*350, 000	Aug. 3, 1886	Feb. 11, 1887	12
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Single screw vertical.	18. 22	None	None.....	†25, 000	.....	.....	.....
Twin screw vertical quadruple expansion.	2. 5	3 torpedo tubes.	3 1 pdr. R. F...	*82, 750	Mar. 3, 1887	Mar. 1, 1888	15
.....do	22. 4	3 15″ Whitehead torpedo tubes.	4 1-pdr. R. F...	*113, 500	June 30, 1890	.....	12

† Limit.

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APPENDIX I.—*Tables of vessels*

IRON AND WOODEN

Name.	Built.			Condition or service.	Rig.
	When.	Where.	By whom.		
IRON.					
Ranger	1873–1876	Wilmington, Del.	Harlan & Hollingsworth.	Repairing U.S. navy-yard, Mare Island.	Bark
Alert	1873–1875	Chester, Pa	John Roach	Asiatic station	do
Monocacy	1863	Baltimore, Md	A. & W. Denmead and Son.	do	Schooner
Michigan	1844	Erie, Pa	United States	Special service Northwestern lakes.	Barkentine
Palos	1865	Boston, Mass	James Tetlow	Asiatic station	Schooner
Pinta	1865	Chester, Pa	Reany, Son & Archibold.	Special service	do
Alarm	1874	New York, N. Y.	United States	Fitting as gunnery ship for training service.	
WOODEN.					
Lancaster	1858	Philadelphia, Pa.	United States	Asiatic squadron	Ship
Pensacola	1858–1862	Pensacola, Fla	do	Pacific station	do
Richmond	1858	Norfolk, Va	do	Training squadron	do
Omaha	1867–1869	Philadelphia, Pa.	do	In ordinary, at navy-yard, Mare Island.	Bark
Swatara	1872	New York, N. Y.	do	do	Ship
Marion	1871–1875	Kittery	do	Asiatic station	Bark
Mohican	1872–1883	Mare Island	do	Pacific station	do
Iroquois	1858	New York	do	do	Ship
Kearsarge	1861	Kittery	do	North Atlantic station.	Bark
Adams	1874–1876	Boston	United States and Donald McKay.	Repairing at U. S. navy-yard, Mare Island.	do
Alliance	1873–1876	Norfolk	United States	Asiatic station	do
Essex	1874–1876	Kittery and Boston.	United States and Donald McKay.	South Atlantic station.	do
Enterprise	1873–1876	Kittery	John W. Griffith and United States.	Practice ship for naval cadets.	do
Nipsic	1873–1879	Washington	United States	In ordinary at navy-yard, Mare Island.	do

*Anthracite.

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of the U. S. Navy—Continued.

STEAM VESSELS.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
ft. In.	*Ft. In.*	*Ft. In.*	*Tons.*					*Tons*		
175 0	32 0	12 9	1,020	365	10	.....	Battery landed	*126	21	127
175 0	32 0	12 9	1.020	365	10	2 IX" S. B ..... 1 XI" S. B. 1 60-pdr. B. L. R.	1 3" B. L. H..... 1 12-pdr. S. B. howts.	*133	21	127
255 0	35 0	9 0	1,370	850	11.2	4 VIII" S. B..... 2 60-pdr. B. L. R.	1 3" B. L. R ..... 1 12-pdr. S. B. howts. 6 H. R. C. 1 Gatling.	†224	12	114
163 3	27 1½	9 0	685	305	10.5	4 30-pdr. B. L. R	3 3" B. L. H ..... 2 Gatlings.	*135	.....	.....
137 0	26 0	9.9	420	246	10.35	4 24-pdr. S. B. howtz 2 20-pdr. R. howitzer	1 12-pdr. S. B. howtz. 2 37mm H. R. C. 1 Gatling.	*102	9	49
137 0	26 0	11 0	550	190	8.5	4 12-pdr. S. B. howtz.	1 Gatling	*111	8	37
158 6	28 0	10 6	800	600	10	1 6" B. L. R.....	2 3-pdr. R. F ..... 1 37mm H. R. C.	*405	.....	.....
235 8	46 0	19 2	3,250	733	9.6	10 8" M. L. R	1 3" B. L. H ..... 2 6-pdr. R. F. 2 1-pdr. R. F. 4 37mm H. R. C. 1 Gatling.	†288	.....	.....
230 8	44 6	18 7	3,000	680	9	12 IX" S. B..... 2 80-pdr. B. L. R. 2 60-pdr. B. L. R. 2 20-pdr. B. L. R. htz.	1 3" B. L. H..... 4 37mm H. R. C. 1 long Gatling.	*285	36	351
225 0	42 6	17 4½	2,700	692	9.5	12 IX" S. B..... 1 8" M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R..... 1 3" B. L. R. 2 37mm H. R. C. 1 Gatling.	†265	29	321
250 6	38 0	16 6	2,400	953	11.3	.....	Battery landed.....	.....	.....	.....
216 0	37 0	16 6	1,900	680	10.1	.....	....do	.....	.....	.....
216 0	37 0	16 6	1,900	753	11.25	1 8" M. L. R..... 6 IX" S. B. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R..... 1 3" B. L. H. 2 37mm H. R. C. 1 Gatling	*135	18	176
216 0	37 0	16 6	1,900	613	10.65	8 IX" S. B..... 1 8" M. L. R. 1 60-pdr. B. L. R.	2 20-pdr. B. L. R ..... 1 3" B. L. H. 1 12-pdr. S. B. howts. 2 37mm H. R. C. 1 Gatling.	*162	21	193
198 10	33 10	15 3	1,575	1,202	10.7	2 8" M. L. R..... 4 60-pdr. M. L. R. 1 60-pdr. B. L. R.	1 12-pdr. S. B. howts. 1 3" B. L. H. 2 Gatlings.	*128	16	176
198 6	33 0	15 9	1,550	843	11.1	4 IX" S. B..... 2 8" M. L. R. 1 60-pdr. B. L. R.	1 3" B. L. H ..... 2 20-pdr. B. L. R. 1 Gatling.	*165	21	191
185 0	35 0	14 3	1,375	550	9.8	.....	Battery landed.....	*150	20	160
185 0	35 0	14 3	1,375	668	9.98	4 IX" S. B..... 1 8" M. L. R 1 60-pdr. B. L. R.	1 3" B. L. H ..... 1 12-pdr. S. B. howts. 1 Gatling.	*150	18	160
185 0	35 0	14 3	1,375	505	10.4	4 IX" S. B..... 1 8" M. L. R. 1 60-pdr. M. L. R.	1 3" B. L. H ..... 1 12-pdr. S. B. howts. 1 Gatling.	†130	15	170
185 0	35 0	14 3	1,375	790	11.4	4 IX" S. B..... 1 8" M. L. R. 1 60-pdr. B. L. R.	2 3" B. L. H ..... 1 37mm H. R. C. 1 Gatling.	*130	18	164
185 0	35 0	14 3	1,375	839	10.7	.....	Battery landed.....	†132	23	161

†Bituminous.

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APPENDIX I.—*Tables of vessels*

IRON AND WOODEN

Name.	Built. When.	Built. Where.	Built. By whom.	Condition or service.	Rig.
WOODEN.					
Talapoosa	1874	Baltimore	C. W. Boos & Co	South Atlantic station.	Schooner
Yantic	1864	Philadelphia, Pa.	United States	South Atlantic station.	Bark
Despatch †	1874		Purchased of H. C. Smith, N. Y.	Special Service †	Schooner
Thetis		Dundee, Scotland.	Alex. Stevens & Sons.	....do	Bark

*Bituminous,

WOODEN SAIL

Constellation	1854	Gosport	United States	Practice ship, Naval Academy.	Ship
Monongahela	1862	Philadelphia	....do	Training Squadron	Bark
Portsmouth	1843	Kittery	....do	....do	Ship
Jamestown	1845	Gosport	....do	....do	....do
Saratoga	1842	Kittery	....do	Nautical school ship, Philadelphia, Pa.	....do
St. Mary's	1844	Washington	....do	Nautical school ship, New York.	...do

STEEL, IRON AND

Name.	Built. When.	Built. Where.	Built. By whom.	Material.
Catalpa	1864		Purchased	Wood
Cohasset	1861		....do	....do
Fortune	1865	Boston	John Tetlow	Iron
Leydon	1866	....do	James Tetlow	....do
Mayflower	1866	....do	....do	....do
Ivy	1863		Purchased	Wood
Nellie	1887	Navy-yard, Mare Island, Cal.	United States	....do
Nina	1865	Chester	Reamy, Son & Archibold.	Iron
Rocket	1863		Purchased	Wood
Standish	1865	Boston	James Tetlow	Iron
Triton	1888	Camden, N. J.	Jno. H. Dialogue	....do
No. One	1891	Boston	City Point Iron Wks.	Steel
No. Two	1891	....do	....do	....do
No. Three	1891	....do	....do	....do

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of the U. S. Navy—Continued.

STEAM VESSELS—Continued.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
Ft. In	*Ft. In*	*Ft. In*	*Tons.*							
240 0	35 0	10 0	1,270	872	12.1	1 8" M. L. R. 5 60-pdr. M. L. R. 4 12-pdr. howtser.	1 Gatling ..... 1 3" B. L. H.	*201	18	14
180 0	30 0	12 2	900	225	8.30	2 IX" S. B..... 1 8" M. L. R. 1 60 pdr. B. L. R.	2 12-pdr. S.B.howtzr. 1 Gatling. 1 3" B. L. H.	*117	20	134
174 0	25 6	12 4	560	518	12.60	1 3" B. L. R.....	None	.....	6	75
166 0	30 3	18 0	1,250	490	7.55	....	1 53-- H. R. C..... 2 Gatlings.	300	10	98

† Wrecked October 10, 1891, on coast of Virginia.

ING VESSELS.

176 0	42 0	20 0	1,186	.....	.....	10 VIII" S. B.....	1 20-pdr. B. L. R..... 2 12-pdr. S.B.howtzr. 1 3" B. L. H. 1 Gatling.	.....	15	203
223 0	38 0	16 6	2,100	.....	.....	....do.....	1 3" B. L. H.....	.....	.....	.....
153 9	38 3	16 6	1,125	.....	.....	1 VIII" S. B..... 1 60 pdr. B. L. R.	1 47-pdr. H. R. C. 2 20-pdr. B. L. R..... 1 3" B. L. H. 1 Gatling.	.....	15	210
163 6	36 0	16 0	1,150	.....	.....	12 VIII" S. B.....	2 20-pdr. B. L. R.....	.....	17	247
147 6	36 1	16 0	1,025	.....	.....	None.....	2 12-pdr. howitser ..	.....	18	275
150 0	37 6	15 6	1,025	.....	.....	8 VIII" S. B.....	None	.....	.....	.....

WOODEN STEAM TUGS.

Rig.	Dimensions.						Displacement.	Indicated horse power.	Speed in knots.	Coal capacity.
	Length between perpendiculars.		Breadth.		Mean draft.					
	Feet.	*In.*	*Feet.*	*In.*	*Feet.*	*In.*	*Tons.*			*Tons.*
.....	97		19	6	6	6	188	.....	.....	.....
Schooner	137		26		9	6	450	340	10	80
.....do	137		26		9	6	450	340	10	80
.....do	137		26		9	6	450	338	10.6	80
.....								340	8.5	.....
.....	60		14		4		32.08	40	8	3.50
Schooner	137		26		8	6	357	340	10	80
.....	85	8	18	10	7		187	147	8.5	.....
Schooner	137		26		9	6	450	340	10	80
.....	96	9	20	9	9		212	300	13	45
.....	92	6	20	11½	8		192.4	300	.....	35
.....	92	6	20	11½	8		192.4	300	.....	35
.....	92	6	20	11½	8		192.4	300	.....	35

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APPENDIX I.—*Tables of vessels*

VESSELS UNFIT

Name.	Built.			Condition or service.	Rig or type.
	When.	Where.	By whom.		
IRON (STEAM).					
Intrepid	1874	Boston, Mass	United States	At navy-yard, Brooklyn, hauled out for repairs, work abandoned.	Brig
Speedwell	1865	....do	James Tetlow	Condemned at Norfolk.	Tugboat
WOODEN (STEAM).					
Hartford	1858	Boston, Mass	United States	In ordinary, Mare Island, Cal.	Ship
Franklin	1855–'65	Kittery, Me	....do	Receiving ship, Norfolk, Va.	....do
Wabash	1854	Philadelphia, Pa.	....do	Receiving ship, Boston, Mass.	Housed over
Minnesota	1855	Washington	....do	Receiving ship for training squadrons, N. Y.	....do
SAILING.					
Constitution	1797	Boston, Mass	....do	Receiving ship, Portsmouth, N. H.	....do
Independence	1837	....do	....do	Receiving ship, Mare Island, Cal.	....do
St. Louis	1828	Washington	....do	Receiving ship, League Island.	....do
Dale	1839	Philadelphia, Pa.	....do	Receiving ship, Washington.	....do
New Hampshire.	1818	Kittery, Me	....do	Receiving ship for boys, New London, Conn.	Ship
Vermont	1818	Boston, Mass	....do	Receiving ship, New York.	Housed over

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of the U. S. Navy—Continued.

FOR SEA SERVICE.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
Ft. In	*Ft. In*	*Ft. In*	*Tons.*					*Tons.*		
170 0	35 3½	11 0	1,150	1,812	10.6	4 24-pdr. hwtzrs	None	*180	.....	.....
137 0	26 0	9 6	450	340	10.0	None	....do	80	.....	.....
225 0	44 0	18 6	2,900	1,024	9.0	.....	.....	*240	32	285
265 9	54 3	24 3	5,170	1,050	9.0	4 IX" S. B.....	2 20-pdr. B. L. R	.....	.....	.....
262 7	51 4	23 0	4,650	950	9.15	18 IX" S. B.....	6 12-pdr. S. B. hwtzr. 2 20-pdr. B. L. R..... 2 12-pdr. S. B. hwtzr.	.....	.....	.....
264 8½	51 4	23 0	4,700	1,000	9.25	8 IX" S. B..... 1 60-pdr. B. L. R.	1 Gatling. 2 3" B. L. H ..... 2 20-pdr. B. L. R. 2 12-pdr. S. B. hwtzr.	.....	.....	.....
175 0	45 0	20 0	2,200	.....	.....	4 32-pdr. S. B.....	1 12-pdr. S. B. hwtzr.	.....	.....	.....
189 0	51 6	21 6	3,270	.....	.....	6 32-pdr. S. B	3-12-pdr. S. B. (light). 1 12-pdr. S. B. (heavy). 1 3" B. L. H.	.....	.....	.....
126 6	32 8	15 6	830	.....	.....	None.....	None	.....	.....	.....
117 7	32 10	14 9	675	.....	.....	....do.....	....do	.....	.....	.....
196 3	53 0	25 6	4,150	.....	.....	....do.....	....do	.....	.....	.....
196 3	58 0	25 6	4,150	.....	.....	....do.....	....do	.....	.....	.....

* Anthracite.

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APPENDIX K.

REPORT SHOWING CONDITION OF WORK ON VESSELS BUILDING OR COMPLETING AT NAVY-YARDS OR UNDER CONTRACT JULY 1, 1891.

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, August 11, 1891.

SIR: In compliance with letter No. 7109, Bureau of Construction and Repair, of June 26, there are herewith submitted reports showing state of work on July 1 on all vessels building or under repair at this navy-yard.

Very respectfully,

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD AND STATION, *New York.*

STATE OF WORK ON CRUISER NO. 7, JULY 1, 1891.

Flat keel plates: Completed.
Vertical keel: Completed.
Stem: In place—upper side plating not riveted.
Stern post: In place—lower strakes of side plating riveted up.
Stern frame: In place—not riveted.
Rudder: Pintle holes bored out, rudder head shaped, four-tenths complete.
Transverse frames: Complete as far as main deck, above protective deck complete to No. 74 with the exception of tranverse bulkhead frames 5, 6, 11, 18, 24, 29, 34, 39, 44, 49, 54, 58, 67, and 71.
Flat keelson plate: Completed.

LONGITUDINALS.

First and second longitudinals: Complete.
Third longitudinals: Eight-tenths completed.
Outside plating: B strake, complete; C strake, complete; D strake, complete; E strake, eight-tenths complete; F strake, nine-tenths complete; G strake, eight-tenths complete; H strake, six-tenths complete; I strake, five-tenths complete; K strake, three-tenths complete.
Inner bottom: Complete with exception of a few plates in engine space.

DECK BEAMS.

Forecastle and poop-deck beams: Not begun.
Gun-deck beams: Complete with exception of angle beams for transverse bulkheads.
Berth-deck beams: One-tenth completed.
Protective deck beams: Completed.
Beams to platform deck: Completed.
Beams under magazines, shell rooms, etc.: Completed forward.
Half beams and carlings: Those to protective deck completed.
Center line bulkhead and passage: Completed and bolted in place.

DECK STRINGERS AND PLATING.

To poop and forecastle decks: Not begun.
Gun-deck stringers and plating: One-tenth completed.
Berth-deck stringers and plating: Not begun.
Protective deck: 20-pound plating completed; 80-pound and 60-pound plating, two-tenths completed.
Platform plating: Completed.
Gutter on main deck: Not begun.
Transverse water-tight bulkheads: Complete below protective deck, except lower course of plates Nos. 59 and 66, left off for convenience.

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COAL BUNKER AND OTHER FORE AND AFT BULKHEADS.

Below protective deck: Wing-bunker bulkhead completed; coal-bunker bulkhead from frame No. 20 to No. 26 completed.
Chain locker: Completed.
Longitudinal bulkhead on platform deck from frame No. 17 to No. 20: Completed.
Bulkheads above protective deck: Bounding angles being fitted and riveted.
Stanchions: Not in place.
Gun sponsons: One-tenth completed.
Platforms for guns: Not begun.
Engine, boiler, and shaft bearers: One-half completed.
Holes in bulkheads for engineer's pipes: Not located.
Shaft tubes and struts: Both struts in place, not riveted; shaft tubes completed as far as possible; two castings yet to be received from contractors.
Water-tight doors: Just begun.
Coffer dams: Not begun.
Ammunition lifts: Not begun.
Magazines: Forward completed.
Shell rooms: Forward completed.
Fixed-ammunition room: Forward completed.
Bilge keels: Three-tenths completed.
Ventilation: One-tenth completed.

DRAINAGE.

Main drain: Completed from frame No. 37 to No. 48.
Secondary drain pipe: One-tenth completed.
All bilge valves: Completed.
Bilge pipes to manifold boxes: Two-tenths completed.
Ventilation of coal bunkers: Not begun.
Steering gear: One-tenth completed.

Considering the time necessary to complete this vessel and fit her for sea, I estimate the work as 35 per cent completed.

Respectfully submitted.

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

STATE OF WORK OF U. S. S. PURITAN, JULY 1, 1891.

Vertical keel: Completed.
Flat keel: Completed.
Stem: Completed.
Stern post: Completed.
Rudder pattern for new rudder has been shipped.
Transverse frames: Completed.
Longitudinals: Completed.
Flat keelson plate: Completed.
Inner bottom: Completed.
Outside plating: Completed, except superstructure.
Main deck beams: Completed.
Berth deck beams: Completed.
Armor shelf: One-quarter of the staples for new armor shelf are in place, together with the angles and upper plating. Hand holes are being cut through the backing plate, and the work is progressing as rapidly as possible.
Main deck armor plating: Completed except plates over side armor and backing which are mostly fitted but not riveted.
Transverse bulkheads: Bulkhead on frame No. 20 has been completed. The lower angles are fitted for bulkheads Nos. 18, 22, 25, 29, 39, 105, and 108. Three plates have been removed and replaced in bulkhead No. 64. Bulkhead No. 109 from berth to main deck has been cut out.
Coal-bunker bulkheads: The lower angles have been fitted for bulkheads Nos. 48 and 56, both sides. The upper shelf for forward fire-room blowers has been cut out, also the fore and after bulkhead from frames Nos. 35 to 39.
Wing-passage bulkhead has been cut out from No. 35 to 39.
Turrets: Barbette framing finished for both turrets, except the shelf plates. Framing and plating for forward turret set up in ship house, completed except girder plates. Framing for after turret set up in ship house complete.
Hawse pipes: In position.
Mooring bitts: Awaiting armor to be placed in position.

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Towing bitts: One in place and the other being cast.
Steam capstan: Windlass and winch on hand; not in position.
Windlass bed: Reverse bars riveted to deck beams.
Drainage and pumping arrangements: Have removed such parts as interfered with other work.
Ventilation: Have removed and are overhauling blowers and such pipes as interfered with other work.
Figures for draft of water: Awaiting armor.
Furniture: Nearly completed.
Boats: Working on second and fourth cutters and also a whaleboat to replace the one taken for the *Philadelphia*, all others ready for finishing touches.

Considering the time necessary to complete this vessel in all respects ready for sea, I estimate the work as more than 50 per cent completed.

Respectfully submitted.

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

STATE OF WORK ON U. S. S. MIANTONOMOH JULY 1, 1891.

All work in this department completed with the exception of the following items:
Sliding door in main air duct.
Method of controlling valves of steam steering gear: Electrical arrangement proposed but not yet approved.
Deck discharge for one hand pump.
Eccentric levers on engine-room hatch.
Main deck guard rail chains.
Awning stanchions and ridge-poles.
Hoisting davits for hatches.
Roof plate of after conning tower.
Canvas water shed around forward turrets.
Battens in main hold.
Boat gripes.
New swinging booms.
Plank sheer and deck to be repaired in places and resquared.
Cement around base of turrets.
Restowing sheet anchor.
Touching up paint.
Roof and conning tower of forward turret.
Awaiting guns and carriages.

All work upon this vessel except forward turret and steering gear will be completed by August 30. The forward turret will require about sixty days to complete. After guns are in position.

Respectfully submitted.

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

STATE OF WORK ON U. S. S. MAINE, JULY 1, 1891.

Vertical keel: Completed.
Flat keel: Completed.
Stem: Completed.
Stern post: Completed.
Rudder: Completed and in position.
Shaft tubes and struts: Tubes in place, but struts condemned.
Transverse frames: Completed.

LONGITUDINALS.

Within the double bottom: Completed.
Before and abaft the double bottom: Completed.
Water courses: Completed up to main deck.

DECK BEAMS.

Berth-deck beams: Completed.
Protective deck beams: Completed.
Platform deck beams: Completed.

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Bridge beams: Not begun.
Half beams and carlings: Completed up to main deck.
Skid beams: Not begun.
Outside plating.
Flat keelson plate: Completed.
Inner bottom: Completed.
Superstructure deck beams forward and after superstructure: Completed. Central superstructure: In position.
Main deck beams: In position; eight-tenths riveted up.
Outside plating: Complete except on central superstructure.

DECK STRINGERS, TIE PLATES AND PLATING.

To main deck: About eight-tenths completed.
To berth deck: Completed except riveting deck plates in wake of boiler hatch, armor bulkhead and inclined protective deck.
Armor bulkhead plates and inclined plating at after end of protective deck not yet received from steel works.
Berth deck: Completed as far as possible until armored bulkhead and inclined deck plates are received.
Protective deck: From frames No. 24 forward and No. 72 aft completed.
Platform decks: Completed.
Engine, boiler, and shaft bearers: Completed.
Gutters on main deck: Completed.
Transverse water-tight bulkheads: Completed up to berth deck.

COAL BUNKER AND OTHER FORE-AND-AFT BULKHEADS.

Coal bunkers: Completed. Fore and aft bulkhead nearly completed up to main deck.
Trunks to coal bunkers: Two-tenths completed.
Shaft alleys: Nine-tenths completed.
Water-tight doors, sluice valves, etc.: Three-tenths completed.
Holes in bulkhead for engineer's pipes: Not located.
Sounding tubes: Not in position.
Chain lockers: Completed.
Stanchions in hold and between decks: Completed in hold, except boiler room; between decks, eight-tenths completed.
Bilge keels: Completed.
Magazines: Ready for fittings.
Passing scuttles: Two-tenths completed.
Ammunition carrier: Not in position.
Shell rooms: Ready for fittings.
Fixed ammunition rooms: Ready for fittings.
Torpedo magazine: Ready for fittings.
Torpedo outfit and store room: Ready for fittings.
Plank sheers and waterways: Not begun.
Deck plank, platform decks: Completed.
Side armor: Templates made and ready for shipment.
Turrets and breastwork, turret and barbette framing: Five-tenths completed.
Cofferdams: One-tenth completed.
Mast partners: In place.
Mast steps: In position.
Windlass bed: In position.
Windlass and capstan: In position.
Manger: One-tenth completed.
Bow stoppers: Not in position.
Deck pipes: Five-tenths completed.
Hawse-pipes: Fitted and but slight alterations to be made.
Chain cable bitts: In position.
Warping bitts: In position.
Steering apparatus: Two-tenths completed.

VENTILATION.

Main air duct under protective deck from frame No. 16 to frame No. 77: Completed. Air duct from frame No. 71 to frame No. 81, and from frame No. 21 to frame No. 15 under berth deck: Completed. Air duct on berth deck: One-half completed.

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DRAINAGE.

Main and secondary drains and valves: Completed. Bilge valves are completed. Connections from sea valves to flood magazines and shell rooms: Completed. Connections from main and secondary drains to steam pump at frame No. 58: Completed.
Bilge and flushing pipes at frame No. 71 to pump No. 5: Completed.
Pumps and tables at frames No. 52 and No. 16: Completed.
All bilge, flushing, and pump pipes about two-thirds completed.

Considering the time necessary to complete this vessel and fit her for sea, I estimate the work as 55 per cent completed.

Respectfully submitted.

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

STATE OF WORK ON U. S. S. TERROR, JULY 1, 1891.

Keel plates, frames, etc.: Completed.
Outside plating: Completed, except on superstructure.
Main deck armor plating: Completed, except over side armor and backing.
Berth deck plating: Completed.
Transverse bulkheads: Completed, except a few plates left off for transporting material.
Fore-and-aft bulkheads: Completed.
Water-tight doors are being fitted in all bulkheads.
Castings for sluice valves are made and are being fitted.
Sounding tubes are one-half in position.
Chain lockers, gratings, and chain pipes are yet to be fitted.
Superstructure framing in place, but not riveted.
Superstructure deck beams in place, except in wake of smoke pipe, but not yet riveted.
Superstructure plating: Lower course partly in place, but not riveted.
After magazines: Completed.
Forward magazines: Not yet ceiled.
Shell rooms, flood cocks: Not finished.
Handling rooms: Completed.
Fixed ammunition rooms: Joiner work not yet done.
Berth-deck plank: Completed except in tiller room.
Belt or side armor: Molds completed.
Wood backing: First course has been fitted and is now being bolted in place.
Turret framing: Shell of forward turret completed except roof beams, dividing bulkhead, and shell conning tower; shell of after turret nearly riveted together on the dock.
Ceiling in hold, storerooms, etc.: Two storerooms yet to be ceiled.
Water-closets: Castings are two-thirds completed.
Coal scuttles: Old ones closed and new ones not yet cut.
Military masts are being riveted in shop.
Boats: A new gig being built to replace the one taken by the *Lancaster;* steam cutter ready for machinery; all others completed.
Steam windlass, winch: Delivered but not yet in place.
Steering gear: On board to be fitted by contractors.
Berth-deck stringers: Completed.
Drainage and pumping arrangements completed to berth deck, except connections to after manifold box.
Ventilation is completed in hold, engine, and fire rooms; berth deck mains awaiting side armor.
Portable furniture completed except fitting looking glasses and small fittings.
Cooperage completed.
Figures for draft of water awaiting armor.
Cement nearly completed.

Considering the time necessary to fit this vessel in all respects ready for sea, I estimate the work as 65 per cent completed.

Respectfully submitted.

W. L. CAPPS,
Assistant Naval Constructor, U. S. Navy.

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NAVAL CONSTRUCTOR'S OFFICE,
UNITED STATES NAVY-YARD,
Norfolk, Va., July 1, 1891.

SIR: Referring to the letter of the Bureau of Construction and Repair, No. 7109, of June 26, 1891, I have the honor to submit the following report of the condition of work July 1, 1891, on the following ships building at this yard instead of the usual monthly report.

U. S. S. TEXAS.

Completed: Keel, stern post, longitudinals, all transverse frames, framing and plating behind armor and armored bulkheads, inner bottom, coal bunkers, and fore and aft bulkheads, central passage and boiler beams (except riveting, which cannot be done until boilers are in ship), engine and shaft bearers, shaft alley, beams of spar, main, protective, and platform decks, stanchions in hold and below protective deck.
All plate and angle work on storerooms, magazines, etc., below protective deck, nine-tenths completed.
Rudder: Machined, fitted, plated, and nearly riveted.
Outside plating: Nine-tenths fitted and three-fourths riveted below protective deck, and six-tenths fitted above protective deck.
Struts: Both erected, fitted, and rivet holes drilled.
Redoubt: Framing and beams all erected, backing all fitted but little riveted, heavy plating on top of redoubt three-tenths fitted.
Turrets: Supports erected; rollers, central castings being machined.
Transverse bulkheads: Above protective deck, two-tenths fitted.
Water-tight doors: Two erected, others awaiting arrival of small castings.
Sluice valves: All completed, two fitted.
Manholes: All fitted.
Plating: Upper deck, six-tenths fitted, not riveted.
Plating: Main deck eight-tenths fitted, one-fourth riveted.
Plating: Protective deck nine-tenths fitted, eight-tenths drilled, six-tenths riveted.
Plating: Platform deck nine-tenths fitted, nine-tenths riveted.
Bilge keels: All plates and angles fitted.
Drainage: All large pipes, cisterns, and nonreturn valves nine-tenths fitted; 6-inch pipe, nine-tenths fitted; valve boxes, large sluice valves, all sea cocks and valves fitted in ship.
Capstan windlass: Received.
Hawse pipes: Molds being made, patterns shipped.
Steering gear: Seven-tenths fitted, none erected.
Percentage of work completed, based on vessel fitted out and ready for sea, 45 per cent.
Weight in ship July 1, 1891, 1,566.7 tons.

U. S. S. RALEIGH.

Completed: Keel, keelson, longitudinals, all transverse frames below protective deck, inner bottom, all machine work on rudder and rudder post, all transverse frames above protective deck but six, all beams below magazines, protective, main, and forecastle decks, all bulkheads below protective deck except central passage, which can not be riveted until after boilers are in ship, lower part of stem, platform deck plating, stanchions under platform and protective decks, engine and shaft bearers, fixed chutes below protective deck, forward trimming tank, all plate and angle work on magazines, storerooms, etc., below protective deck.
Stem: Upper part fitted and riveted to lower.
Stern post: Drilled and fitted, three-fourths riveted.
Outside plating below protective deck: Fitted and six-tenths riveted.
Outside plating above protective deck: Five-tenths fitted.
Deck stringers and plating, gun deck: Eight-tenths fitted, five tenths riveted.
Deck stringers and plating, protective deck: All ½-inch plates fitted and riveted; 2-inch plates nine-tenths fitted, five-tenths riveted; all 2-inch plates not yet received.
Transverse water-tight bulkheads above protective deck: Seven-tenths fitted.
Longitudinal water-tight bulkheads above protective deck: Eight-tenths fitted.
Stanchions, under gun and berth decks: Four-tenths made.
Sponsons: Two-tenths fitted.
Boiler bearers: Eight-tenths fitted.
Shaft tubes: Nine-tenths fitted, eight-tenths riveted.

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Struts: Not received.
Water-tight doors: Three-tenths made.
Hammock berthing: Two-tenths erected.
Cofferdams: All brackets and top plates fitted, sides six-tenths fitted.
Windlass: Received.
Hawse pipes: Making patterns.
Trimming tank, aft: Eight-tenths completed.
Drainage: Cisterns, all 10-inch and 6-inch pipes and two 10-inch nonreturn valves and two valve boxes fitted; all valve boxes made and all valves received.
Bilge keels: All plate and angle work completed.
Steering gear: Two-tenths fitted, all forgings not received.
Percentage of work completed based on vessel fitted out and ready for sea, 50 per cent.
Weight in ship July 1, 1891, 741.63 tons.

U. S. MONITOR AMPHITRITE.

Completed: Tearing out all old work interfering with alterations, closing old hatches and cutting new, cutting out and closing up old deck lights and fitting new, superstructure framing beams, chain lockers, skid beams.
Main-deck armor plating: All lower course and all upper course but seven plates fitted.
Berth-deck plating: Nine-tenths fitted, three-fourths riveted.
Superstructure plating: Nine-tenths fitted, three-fourths riveted.
Transverse and fore and aft bulkheads: Nine-tenths fitted, eight-tenths riveted.
Stanchions: All made, nine-tenths fitted.
Superstructure deck stringers: Nine-tenths fitted, five-tenths riveted.
Hammock berthing: Six-tenths fitted.
Turrets: Forward supports nine-tenths fitted, barbette plating seven-tenths fitted, three-tenths riveted.
Turrets: Aft supports seven-tenths fitted; barbette backing one-tenth fitted.
Awning and life-line stanchions: Nine-tenths made.
Boat derricks: One-half made.
Furniture: Two-tenths made.
Percentage of new work completed, based on vessel fitted out and ready for sea, 25 per cent.
The only vessel under repair is the U. S. S. *Dolphin*.
Percentage of work to be done before completion, 95 per cent.
Estimated time for completion, 60 days.
Negatives of 3 views of the U. S. S. *Texas*, *Raleigh*, and *Amphitrite* forwarded herewith.

Very respectfully,

FRANCIS T. BOWLES,
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER, U. S. Navy,
Commandant.

Respectfully forwarded for the information of Chief of Bureau of Construction and Repair.

A. W. WEAVER,
Commodore, Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
NAVY-YARD, MARE ISLAND, CAL.,
July 18, 1891.

SIR: In obedience to the order of the Bureau of Construction and Repair contained in its letter, No. 7109 of the 26th ultimo, I have the honor to report the condition of the work on the *Monadnock* on July 1, under the items given by headings of paragraphs in the specifications, as follows:
Main deck armor plating: Eight new and seven old plates to be fitted to complete deck, except plates around side lapping over side armor, none of which are fitted. Riveting and calking in wake of boiler openings not to be done until after engines and boilers are on board. Armor gratings, shutters, and water-tight scuttles not commenced.
Berth deck plating: Just received, drawings prepared and work about to commence.

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Traverse bulkheads: No. 17, erected but not riveted or calked; No. 34, worked and partly erected; No. 38, erected, riveted and partially calked; No. 47, erected, except casing for companion-way through bulkhead, not yet fitted, bulkhead riveted and partly calked; No. 57, erected but not riveted or calked.
No. 68: Erected, but not riveted or calked.
No. 77: Erected, but not riveted or calked.
No. 86: Erected, but not riveted or calked.
No. 97: Erected, but not riveted or calked.
No. 110: Erected, but not riveted or calked.
Fore and aft bulkheads: Longitudinal passageway bulkhead, greater part erected; supporting brackets under flat and water-tight staples on armor deck beams not yet fitted. Longitudinal coal-bunker bulkheads, about two-thirds of the plates and stiffeners in place and partially riveted up. Longitudinal shaft alley bulkheads completed.
Superstructure framing: Z bars have been commenced; bottom angles connecting plating to armor deck being worked.
Superstructure deck beams: Commenced.
Magazines: Forward and after magazine bulkheads are completed.
Shell rooms: Forward and after shell room bulkheads are completed.
Handling rooms: Forward handling room bulkhead partly erected, after handling room bulkhead completed.
Belt armor: Side lined off and templates prepared.
Barbette turrets: Patterns for steel rack commenced.
Water tanks: Forward water-tank bulkheads partly erected.
Testing water-tight compartments, tanks, etc.: Two of the compartments of the double bottom have been tested.
Plans of proposed engine and boiler bearers with strengthening in double bottom under way.

Where the headings of paragraphs of specifications are not mentioned no work has been done included under them.

The work completed, including the old work done under contract, based on the final completion of the vessel and outfit ready for sea, I estimate at 45 per cent.

I have the honor to forward herewith three negatives, one of the exterior and two of the interior of the vessel, taken on July 7.

There are no vessels under repair at the present time.

Very respectfully,

J. H. LINNARD,
Naval Constructor, U. S. Navy.

Rear-Admiral JOHN IRWIN, U. S. Navy,
Commandant Navy-Yard, Mare Island, Cal.

COMMANDANT'S OFFICE,
NAVY-YARD, MARE ISLAND, CAL.,
July 18, 1891.

Forwarded to Chief Constructor.

JOHN IRWIN,
Commandant.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
Philadelphia, July 1, 1891.

SIR: In pursuance of the Bureau's order of June 26, 1891, No. 7107, I have the honor to report the condition of work to date on the four United States naval vessels building under contract at these works by the Messrs. Cramp & Sons, as follows:

U. S. ARMORED CRUISER, NO. 2 (NEW YORK).

Flat keel plates: Completed.
Vertical keel: Completed.
Stem: Completed.
Stern post: Completed.
Stern frame: Completed.
Rudder: Being forged.
Transverse frames: Completed.
Flat keelson plates: Completed.
Longitudinals: Completed.
Outside plating: Very nearly completed.
Inner bottom: Very nearly completed.

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Deck beams: Completed.
Coal bunker and other fore and aft bulkheads: Very nearly completed below protective deck, excepting engine room bulkhead.
Deck plating, stringers, etc: Nearly completed.
Transverse water-tight bulkheads: Nearly completed below protective deck.
Gutters on decks: Well advanced.
Stanchions between decks: Well advanced.
Engine, boiler and shaft bearers: About half completed.
Shaft tubes and struts: Being cast.
Water-tight doors: Commenced.
Armor on outside of hull plating, armored harbettes and framing, armored tubes to same, armored protection to the 8-inch broadside guns; also to the 4-inch guns and secondary battery: Templets being made and some of them ready to be shipped.
Gun supports for 8-inch amidship guns. Foundations being prepared, Hatch coamings, skylights and inclosures to same: Well advanced.
Bilge keels: Nearly completed.
Magazines: Metal work nearly completed forward, well advanced aft.
Shell rooms: Bulkheads up.
Passing scuttles: Holes being cut.
Hammock berthing: Commenced.
Coaling scuttles: Well advanced.
Chain lockers: Well advanced.
Scuppers: Being cut.
Drainage and pumping: Commenced.
Water tanks: Commenced.
Firemen's wash rooms: Angle bars in place for bulkheads.
Lavatory for crew: Angle bars in place for bulkheads.
Water-closets and urinals for crew: Angle bars in place for bulkheads.
Seatings for steering arrangements: Commenced.
Steering arrangements: Well advanced in shop.
Air ports: Well advanced.
Ventilation: Commenced.
Deck pipe and hawse pipe: Commenced.
Anchor beds: Nearly completed.
Plank of upper deck: Commenced.
Protective deck: Very nearly completed.

Nearly five-tenths of the work on this vessel is completed, and it is estimated that she will be ready for the contractor's trial and final delivery to the Government on the 1st day of April and 30th of June, 1893, respectively.

U. S. PROTECTED CRUISER No. 12.

Flat keel plates: Nearly completed.
Vertical keel: Nearly completed.
Stem: Nearly completed.
Transverse frames: Nearly all up below protective deck.
Flat keelson plates: Nearly all done.
Longitudinals: Nearly all done.
Outside plating: About two-thirds done below the protective deck.
Inner bottom: Nearly completed.
Protective deck beams: Nearly all in place.
Transverse water-tight bulkheads: Begun.
Protective deck: Commenced.
Outfit—boats:
2 cutters (28 feet): Very nearly completed.
1 cutter (28 feet): Keel and stern post made and scarfed.

About two-tenths of the hull work on this vessel is completed, and it is estimated that she will be ready for the contractors' trial and delivery to the Government on May 30 and August 15, 1893, respectively.

U. S. BATTLE SHIP No. 1 (INDIANA).

Flat keel: Nearly completed.
Vertical keel: Nearly completed.

About one-thirtieth of the hull work on this vessel is completed, and it is estimated that she will be ready for the contractors' trial and final delivery on November 1, 1893, and February 15, 1894, respectively.

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U. S. BATTLE SHIP NO. 2 (MASSACHUSETTS).

One-half outer and inner keel laid.

About one-thirtieth of the hull work on this vessel is completed, and it is estimated that she will be ready for the contractors' trial and final delivery on the 1st day of December, 1893, and March 15, 1894, respectively.

Very respectfully, your obedient servant,

J. F. HANSCOM, U. S. N.,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF NAVAL CONSTRUCTOR,
San Francisco, Cal., July 27, 1891.

SIR: In compliance with the Bureau's order No. 7107, of June 26, 1891, I have the honor to transmit the following report, showing the actual condition of work on the hull of the armored coast defense vessel *Monterey* on July 1, 1891, made in detail and following the items given by headings of paragraphs in specifications:

No.	Paragraph in specifications. Heading.	Condition.
1	Summary of work	Instructions being carried out.
2	Material	No steel used except such as passed Government requirements; all other material best quality.
3	Workmanship	Thorough.
4	Weighing material	Required reports being made monthly.
5	Articles to be furnished by Government.	No articles yet furnished by Government.
6	Superintending construction office and drafting room.	Suitable office and drafting room furnished.
7	Drawings	Contractors' drawings completed.
8	Vertical keel	Completed.
9	Flat keel	Completed.
10	Armor shelf	Do.
11	Stem	Do.
12	Stern post	Do.
13	Rudder	Do.
14	Shaft tubes and struts	Do.
15	Transverse frames	Do.
16	Longitudinals	Do.
17	Watercourses	Do.
18	Superstructure deck beams	Do.
19	Main deck beams	Do.
20	Berth deck beams	Do.
21	Half beams and ledges	Do.
22	Skid beams	Do.
23	Outside plating	Do.
24	Flat keelson plate	Do.
25	Inner bottom	Do.
26	Spar deck stringer, tie plates, and plating.	Do.
27	Main deck plating	Completed except securing outer strake to belt armor.
28	Berth deck stringers, tie plates and plating.	Completed.
29	Engines, boiler, and shaft bearers	Do.
30	Hammock berthing	Completed at sides except berthing boards and eyebolts.
31	Transverse W. T. bulkheads	Completed.
32	Coal bunker and other fore and aft bulkheads.	Do.
33	Shaft alleys	Do.
34	W. T. doors, sluice valves, etc	Do.
35	Holes in bulkheads for engineer's pipes.	Being made water-tight as directed.
36	Sounding tubes	All but eight completed.
37	Chain lockers	Completed except iron gratings; latter completed in shops.
38	Stanchions in hold and between decks.	Completed
39	Magazines	Completed except joiner work.
40	Shell rooms	Do.
41	Handling rooms	Bulkheads completed but no other work done.
42	Ammunition carrier	Nothing done.
43	Fixed ammunition rooms	Do.
44	Bridge and pilot house	Bridges nearly completed; pilot house just begun.
45	Plank sheer, main deck	Just begun.

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	Paragraph in specifications. Heading.	Condition.
46	Deck plank	Instructions being carried out so far as deck plank is laid.
47	Superstructure deck plank	Nothing done.
48	Main deck plank	Deck laid outside of superstructure; not calked.
49	Berth deck plank	Completed except in wing passages.
50	Belt armor	Templates and drawings forwarded.
51	Armor bolts	Drawings forwarded.
52	Barbette turrets	Completed except wood backing and armor; roller paths completed in shops.
53	Conning tower	Drawings of conning tower and armored tube forwarded.
54	Armored smoke pipe	Drawings forwarded.
55	Wood backing	Completed for belt armor; not begun for barbettes.
56	Ceiling in hold, storeroom, etc	Completed.
57	Wardroom	Bulkheads between storerooms about one-third completed; deck cleats in place; other joiner work completed in shops.
58	Cabin	Deck cleats in place; other joiner work completed in shops.
59	Steerage	Completed except joiner work.
60	Chronometer and compass lockers or chests.	Nothing done.
61	Sail or awning rooms	Completed except gratings and lignum vitæ rollers.
62	Storerooms	Completed except casing a few sounding tubes and sluice gate stems.
63	Paymaster's office	Nothing done.
64	Captain's office	Do.
65	Executive officer's office	Do.
66	Navigator's office	Do.
67	Armory	Completed except joiner work.
68	Sick bay	Joiner work just begun; bath tub, washstand and water-closet not yet fitted.
69	Dispensary	Joiner work just begun.
70	Prison	Completed.
71	Master at arms' locker	Nothing done.
72	Signal locker or chest	Nearly completed.
73	Engineer's and ordnance workshop	Nothing done.
74	Engineer's log room	Do.
75	Pantries	Do.
76	Water-closets	Discharge pipes fitted; crew's W. C. troughs fitted; no joiner work done.
77	Bath rooms	Nothing done.
78	Lavatory for steerage officers	Do.
79	Galley inclosure	Bulkheads nearly completed; no other work done.
80	Lavatory for crew	Nothing done.
81	Firemen's wash room	Do.
82	Mess tables and benches for crew	Do.
83	Mess and clothes lockers for crew	Do.
84	Lamp room	Do.
85	Hatch coamings and skylights	Nearly completed.
86	Gratings and hatch covers	About half completed in shops.
87	Rubbing plates	Nothing done.
88	Awning and life-line stanchions	Almost completed in shops.
89	Guard rails and stanchions	Bridge stanchions completed; remaining work completed in shops.
90	Hatch cranes	Completed.
91	Brass label plates	Completed for sluice and flush gates; no others yet made.
92	Shot racks and musket racks	Nothing done.
93	Lumber irons	Do.
94	Reels	Do.
95	Running lights	Do.
96	Ship's bell	Completed in shop.
97	Deck lights	Completed.
98	Air ports	Completed, except four.
99	Coal scuttles	Completed.
100	Water tanks	Completed, except cementing and lock and key.
101	Chain stoppers	Cast.
102	Hawse pipes	Patterns very nearly completed.
103	Bill boards	Bill boards and all anchor gear completed in shops.
104	Mooring bitts	6 pairs completed and secured; 2 pairs just cast.
105	Warping chocks	All completed and on board, but not yet secured in place.
106	Military mast	Completed; boat booms completed in shops.
107	Mast step	Completed.
108	Ringbolts in deck	Nothing done.
109	Iron rungs or ladders	Do.
110	Ladders to companion ways, etc	Completed in shops.
111	Hammock hooks	Do.
112	Eyebolts in beams	Nothing done.
113	Oil tanks	Half completed in shops.
114	Canopies	Completed for engine and fire room hatches; remainder not begun.
115	Swinging booms for boats	Nothing done.
116	Signal and ensign staffs	Nearly completed in shops.

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	Paragraph in specifications. Heading.	Condition.
117	Boats	Not yet begun.
118	Boat davits, cranes, and cradles	Boat davits completed; boat cranes completed in shops; boat cradles half completed.
119	Anchor davits	Nothing done.
120	Steam capstan, windlass, and winch	Capstan and windlass completed except piping; winch completed in shops.
121	Windlass bed	Completed.
122	Steering apparatus	Completed in tiller room; balance about completed.
123	Speaking tubes and telegraphs.	Nothing done.
124	Drainage and pumping arrangements.	Almost completed.
125	Pumps	Completed, except fire main, which is three-fourths completed, and excluding hose, hose reels, and a few small fittings.
126	Ventilation	Blowers in place; ventilation system almost completed.
127	Ventilation of coal bunkers	Nothing done.
128	Fresh air supply pipes to bunkers	Do.
129	Forced draft in firerooms	Completed.
130	Electric lighting	Dynamos and engines completed in shops; engine foundations completed; no other work done.
131	Portable furniture	Just begun.
132	Cooperage	Nothing done.
133	Miscellaneous outfit	Do.
134	Figures for draft of water	Completed.
135	Heeling ship	Nothing done.
136	Cleaning, galvanizing, etc	Instructions being carried out.
137	Coatings decks	Nothing done.
138	Calking	Berth deck planking calked; balance of calking one-third done.
139	Cement	Completed.
140	Cleaning dirt, chips, etc., from bilges, compartments, etc.	Vessel is being kept clean.
141	Painting and otherwise coating steel, iron, and wood work:	
	Inside hold	1 coat red lead.
	Double bottom	2 coats red lead.
	Storerooms	Do.
	Do	1 coat cork.
	Do	1 coat white paint over cork.
	Do	1 coat white lead on joiner work.
	Cabin bulkheads (wood)	1 coat white lead.
	Superstructure	1 coat red lead.
	Outside of ship	Cemented and 3 coats red lead.
142	Testing red lead	Red lead tested and found satisfactory.
143	Testing water-tight compartments, water tanks, etc.	Completed.
144	General fastenings, quality of material, and workmanship.	Instructions being carried out.
145	Testing forged work	Forged work being properly tested.
146	Sundry fittings	Instructions being carried out.

In my opinion the work on the hull is 70 per cent completed.

The time of completion of the ship, so far as the hull is concerned, depends principally upon the delivery of the armor. If all the armor were now at these works the vessel could be ready for the contractors' trial by December 1, and could be turned over to the Government within two months after the successful completion of the trials. As none of the armor has yet been delivered here, and as I have no means of ascertaining when it may be expected, it is impossible for me to make a more definite estimate as to the time of her completion.

I transmit herewith contractors' letter of July 20, 1891, giving their views as to the probable time of completion of all the vessels being built by them for the Navy.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor, T. D. WILSON, U. S. Navy,
Chief of the Bureau of Construction and Repair,
Navy Department, Washington, D. C.

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OFFICE OF NAVAL CONSTRUCTOR,
San Francisco, Cal., July 30, 1891.

SIR: In compliance with the Bureau's order No. 7107, of June 26, 1891, I have the honor to transmit the following report of the actual condition of work on July 1, 1891, on hull of Cruiser No. 6.

Flat keels: Outer keel plates in place on blocks. Inner keel plates bent and ready to be placed in position.
Vertical keel: Plates punched and ready to go in place.
Stem: Patterns of both parts of stem completed.
Stern post: Patterns completed.
Rudder: Rudder stock forged and turned; composition casing in place.
Transverse frames: Main and reverse frames within double bottom between frames 26 and 27 bent and punched.
Deck beams: All but 10 protective deck beams bent and punched.
Protective deck plating: Nearly all in shops being straightened and marked preparatory to being machined to dimensions.
Shaft struts: Patterns completed.
Hinged water-tight doors: Seventy-six brass framed hinge doors completed in shops.
Sliding water-tight doors: Thirty-two vertical-sliding and 2 horizontal-sliding doors completed in shops.
Hatch scuttles: Completed in shops.
Coal scuttles: Fourteen coal scuttles completed.
Manholes: Thirty-six brass manhole frames and covers completed.
Coal-chute plugs: All completed.
Pumping and drainage: Pipe flanges, sluice gates, deck sockets, and many small details completed in shops.
Steering arrangements: Main hydraulic cylinders cast and bored, piston rods begun, slides lined and bored, one long main link forged, tiller completed except fitting to rudder stock, hand-steering shaft and coupling completed, hand-steering wheels completed, line shafting gears, brackets, pedestal, etc., completed and ready to go on board.
Air ports: Twenty-six air ports on protective deck completed; 12 air ports in hatch casings completed; 12 deadlights in hatch casings completed.
Ventilation: Considerable experimental work has been done in connection with a proposed system of high-pressure ventilation.
Capstan and windlass: Plans submitted to Department.
Anchor gear: All completed in shops.
Accommodation ladder: Ironwork completed.
Boat booms: Ironwork completed.
Bitts and chocks: All completed.
Masts: Forged work completed.
Ship's bell: Completed.
Light box covers: Nine completed.
Chain stoppers: Two completed.
Wire hawser reels: Two completed.
Wire hawser nippers: Castings for 2 nippers made and half completed.
Hand rail and stanchions: Completed.
Awning stanchions: Completed.
Miscellaneous work: A large number of miscellaneous forgings for hatches, side ladders, sea steps, and many small details of fittings have been completed.

About 600 tons of material have been received.

In my opinion the work on this vessel is 28 per cent completed including material and labor.

Considerable difficulty has been experienced in getting material for this vessel, and certain causes of delay are still in operation; but it seems likely that this vessel will be completed within the contract time, though in view of the uncertainty attending the delivery of material it is impossible for me to set a definite date for her completion.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, *U. S. Navy,*
Chief of the Bureau of Construction and Repair,
Navy Department, Washington, D. C.

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OFFICE OF NAVAL CONSTRUCTOR,
San Francisco, Cal., July 30, 1891.

SIR: In compliance with the Bureau's order, No. 7107, of June 26, 1891, I have the honor to transmit the following report of the actual condition of work on July 1, 1891, on hull of battle ship No. 3, *Oregon*.

The lines for this vessel have been laid down.
Working drawings are about half completed.
Plans of steering gear, anchor davits, etc., submitted to Department.
A new building slip has been built, to efficiently support which it has been necessary to drive over 1,200 piles.
Staging is being erected for the 2 overhead traveling cranes which are now being built.
Keel blocks are now being laid.
Nearly all the material has been ordered.
First shipment of material arrived June 16, 1891.
About 300 tons of material has been received.

In my opinion the work on this vessel is 4 per cent completed, including material and labor.

The actual construction work on the vessel not yet being fully under way it, is impossible at present to give any definite idea as to the date of her completion, though it seems reasonably certain that she will be completed within the contract time.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. N., Superintending Constructor.

Chief Constructor T. D. WILSON,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

REPORT OF THE SUPERINTENDING CONSTRUCTOR OF UNITED STATES CRUISER NO. 9, ON CONDITION OF WORK ON THE HULL, UP TO AND INCLUDING JUNE 30, 1891.

Vertical keel: Completed.
Flat keel: Completed.
Stem: Completed.
Stern post: Completed except as to boring and fitting torpedo tube; brasses for stuffing box not made.
Stern frame: Completed.
Rudder: Frames and plates in yard.
Transverse frames: Completed.
Main-deck beams: Completed.
Water-tight deck beams: Completed.
Berth-deck beams: Completed.
Poop and forecastle deck beams: All in place and secured, save around gun sponsons.
Beams to platform decks: Completed.
Half beams and carlings: Completed.
Skid beams for boats: Material in yard.
Longitudinals: Completed.
Flat keelson plates: Completed.
Outside plating: Completed up to gun deck, at ends at top of poop and forecastle, save around shaft tubes.
Center-line bulkhead: Completed as far as can be until boilers are put in.
Transverse water-tight bulkheads and coal bunker, and other fore and aft bulkheads: Mostly in ship, and secured as far as possible, considering that most of the waist of the ship will have to be removed in order to put the boilers in place.
Water-tight deck: All in place and riveted, except over the boilers.
Girders: All in place and mostly riveted.
Bilge keels: Completed.
Shaft struts: Material not yet in yard.
Shaft tubes: Material in yard.
Water-tight doors: Dogs and frames well along.
Engine, boiler, and shaft bearers: Engine and some of the auxiliary foundations completed. Others nearly so.
Poop and forecastle, deck stringers and plating: Mostly in place, and riveted.
Gun-deck stringers and plating: All in position and riveted, except over the boilers.

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Berth-deck stringers and plating: Completed.
Breasthook: Completed.
Platforms: Nearly completed.
Stanchions in hold and under poop and forecastle: Nearly completed.
Gutters on gun deck: Material in yard.
Plank-sheers and waterways: Material in yard, partially shaped.
Deck plank: All in yard, laid under poop, and forecastle.
Hammock berthing: Material in yard; frames in place.
Freeing ports: Material in yard; work begun.
Torpedo arrangements: Pattern made for castings.
Sponsons for guns: Most of the material fitted to ship; armor not received.
Gun supports, 6-inch: Steel work completed, except as to doors.
Mast partners: Nearly completed.
Windlass bed: Completed.
Mast steps: Completed.
Hatch coamings and skylights: Metal skylights not begun; woodwork for wood skylights fitted up in shop; gratings are partially made; coamings well advanced.
Air ports: Metal work nearly completed in shop.
Ladders (side), sea steps, etc.: Material in yard and partially worked.
Guard rail and stanchions: Material in shape and machining well advanced.
Ladders to hatchways: Mostly made.
Galley house, bed, etc.: Steel work completed as far as possible before galley is in.
Coffer dams: Material fitted in ship and partially secured.
Hawse pipes: Pattern made and casing pipes in ship.
Windlass and capstan: In yard but not erected.
Manger: Nearly completed.
Wood pilot house: Partially built.
Chain lockers: Nearly completed.
Water tanks: Completed.
Coal scuttles: Made in shop.
Trunks to coal bunkers: Material in yard, some in place.
Magazines: Steel work nearly completed.
Shell room: Steel work nearly completed.
Fixed-ammunition room: Steel work nearly completed.
Passing scuttles: Castings mostly finished.
Ammunition lifts: Castings mostly finished.
Drainage and pumping: Much of the pipe and fittings in yard.
Trimming tanks: Nearly completed.
Sluice valves, pipes, etc.: Bilge sluice valves in place, some of the iron pipe in yard.
Ceiling in hold, storerooms, etc.: Wood material in yard.
Ward room: Lumber and much of the millwork in yard.
Junior officers' quarters: Lumber and much of the millwork in yard.
Cabins under poop: Lumber and much of the millwork in yard.
Chronometer and compass locker: Material in yard.
Sail room: Material in yard.
General storerooms: Lumber in yard and partially worked.
Prisons: Metal work well along.
Swinging tables and benches for crew: Woodwork nearly done.
Engineers' workshop: Material in yard.
Engineers' log and store room: Material in yard.
Ordnance workshop: Material in yard.
Pantries: Most of material in yard.
Refrigerating room: Lumber in yard; partly worked.
Reels: Hose racks nearly completed.
Painting steel: Work begun.
Painting, graining, and polishing wood work: Millwork which is in yard has been polished.
Cement: Bilges mostly cemented.

No work has been done on the following (except drafting):

Portable coaling chutes, machine gun, and torpedo port shutters; platforms for guns; hammock hooks, bridges, canopies, hatch cranes, shot and musket racks, lashing bolts, attachments for rigging, chain, plates, etc.; chocks for fair leads, pin rails, lumber irons, life-buoy guards, brass rubbing plates, Jacob's ladders, running lights, swinging booms, ensign staff, deck lights, watch bell, boat davits and cradles, bow stoppers, deck pipes, warping pipes, warping or towing bitts, steel wire nippers, ringbolt in deck, anchor davits, bill boards, conning tower, steering apparatus, ash chutes, wood floors in coal bunkers, torpedo stowage, ventilation, forced draft in fire rooms, sounding tubes, water alarm, coal-bunker fire alarm, speaking tubes and telegraph, paymaster's office, armory, master-at-arms' locker, signal locker, dispensary, engineer's stores, water-

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closets, lavatories, brass label plates, mess and clothes lockers for crew, eye-bolts in beams, lamp room, calking, varnishing decks, oil tank, figures for draft of water, installation of electric lights, electric bells, scuppers.

The present condition of the hull of this vessel shows that fourteen-twentieths of the work has been completed.

As regards the time of launching I would name for this vessel about the 15th of December of the present year.

I place the time of the trial (contractor's) at September 1, 1892, and a final delivery to the Government November 1, same year.

I forward herewith photographic negatives showing progress to date.

Respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor Cruisers 9 and 10.

Chief Constructor T. D. WILSON, U. S. N.,
Navy Department, Washington, D. C.

REPORT OF THE SUPERINTENDING CONSTRUCTOR OF UNITED STATES CRUISER NO. 10, ON CONDITION OF WORK ON HULL, UP TO AND INCLUDING JUNE 30, 1891.

Vertical keel: Completed.
Flat keel: Completed.
Stem: Completed.
Stern post: Completed, except as to boring and fitting torpedo tube; brasses for stuffing box not made.
Stern frame: Completed.
Rudder: Frame and plates fitted.
Transverse frames: Completed.
Main-deck beams: Completed.
Water-tight deck beams: Completed.
Berth-deck beams: Completed.
Poop and forecastle deck beams: All in place and secured save around gun sponsons.
Beams to platform decks: Completed.
Half beams and carlings: Completed.
Skid beams for boats: Material in yard.
Longitudinals: Completed.
Flat keelson plates: Completed.
Outside plating; Completed up to gun deck, at ends, at top of poop and forecastle, save around shaft tubes.
Center-line bulk: Completed as far as can be until boilers are put in.
Transverse water-tight bulkheads, coal bunker, and other fore and aft bulkheads: Mostly in ship, and secured as far as possible, considering that most of the decks will have to be removed to put in the boilers.
Water-tight deck: All in place and riveted, except over boilers.
Girders: All in place and mostly riveted.
Bilge keels: Completed.
Shaft struts: In place.
Shaft tubes: In yard, partly bored.
Water-tight doors: Dogs and frames well along.
Engine, boiler, and shaft bearers: Engine and some of the auxiliary foundations completed; others nearly so.
Poop and forecastle deck stringers and plating: Mostly in place and riveted.
Gun-deck stringers and plating: All in place and riveted, except over boilers.
Berth-deck stringers and plating: Completed.
Breasthook: Completed.
Platforms: Nearly completed.
Stanchions in hold and under poop and forecastle: Nearly completed.
Gutters on gun deck: Material in yard.
Plank-sheers and waterways: Material in yard, partially shaped.
Deck plank: All in yard, laid under poop and forecastle.
Hammock berthing: Material in yard; frames in place.
Freeing ports: Material in yard; work begun.
Torpedo arrangements: Pattern made for castings.
Sponsons for guns: Most of material fitted to ship (armor not received).
Gun supports: Steel work completed, except as to doors.
Mast partners: Nearly completed.
Windlass bed: Completed.
Mast steps: Completed.

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Hatch coamings and skylights: Metal skylights not begun; wood work for wood skylights fitted up in shop; gratings are partially made; coamings well advanced.
Air ports: Metal work nearly completed in shop.
Ladders (side), sea steps, etc.: Material in yard and partially worked.
Guard rail and stanchions: Material in shape and machining well advanced.
Ladders to hatchways: Mostly made.
Galley house, bed, etc.: Steel work completed ar far as possible before galley is in.
Coffer dams: Material fitted in ship, partly secured.
Hawse pipes: Pattern made and casing pipes in ship.
Windlass and capstan: In yard, but not erected.
Manger: Nearly completed.
Wood pilot house: Partially built.
Chain lockers: Nearly completed.
Water tanks: Completed.
Coal scuttles: Made in shop.
Trunks to coal bunkers: Material in yard; some in place.
Magazines: Steel work nearly completed.
Shellroom; Steel work nearly completed.
Fixed ammunition room: Steel work nearly completed.
Passing scuttles: Castings mostly finished.
Ammunition lifts: Castings mostly finished.
Drainage and pumping: Much of the pipe and fittings in yard.
Trimming tanks: Nearly completed.
Sluice valves, pipes, etc.: Bilge sluice valves in place; some of the iron pipe in yard.
Ceiling in hold, store rooms, etc.: Wood material in yard.
Wardroom: Lumber and much of the mill work in yard.
Junior officers' quarters: Lumber and much of the mill work in yard.
Chronometer and compass locker: Material in yard.
Cabins under poop: Lumber and much of the mill work in yard.
Sailroom: Material in yard.
General and storerooms: Lumber in yard and partially worked.
Prisons: Metal work well along.
Swinging tables and benches for crew: Woodwork most done.
Engineer's workshop: Material in yard.
Engineer's log and store room: Material in yard.
Ordnance workshop: Material in yard.
Pantries: Most of material in yard.
Refrigerating room: Lumber in yard partly worked.
Reels: Hose racks nearly completed.
Painting steel: Work begun.
Painting, graining, and polishing woodwork: Mill work which is in yard is polished.
Cement: Bilges mostly cemented.
No work has been done on the following (except drafting): Portable coaling chutes, machine gun and torpedo port shutters, platforms for guns, hammock hooks, bridges, canopies, hatch cranes, shot and musket racks, lashing bolts, attachments for rigging chain plates, etc., chocks for fair lead, pin rails, lumber irons, life buoy guards, brass rubbing plates, Jacob's ladders, running lights, swinging booms, ensign staff, deck lights, watch bells, boat davits and cradles, bow stoppers, deck pipes, warping pipes, warping or towing bitts, steel wire nippers, ring bolt in deck, anchor davits, bill boards, conning tower, steering apparatus, ash chutes, wood floors in coal bunkers, torpedo stowage, ventilation, forced draft in fire rooms, sounding tubes, water alarm, coal bunker fire alarm, speaking tubes and telegraph, paymaster's office, armory, master at arms' locker, signal locker, dispensary, engineer's stores, water closets, lavatories, brass label plates, mess and clothes lockers for crew, eyebolts in beams, lamp room, calking, varnishing decks, oil tank, figures for draft of water, instalation of electric lights, electric bells, scuppers.

The present condition of the hull of this vessel shows that fourteen-twentieths of the work has been completed.

As regards the time of launching, I would name for this vessel the 10th of September of the present year.

I place the time of the trial (contractors') at August 1, 1892, and final delivery to the Government October 1 of same year. I forward herewith photographic negatives showing progress to date.

Respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor Cruisers Nos. 9 and 10.

Chief Constructor T. D. WILSON, U. S. N.,
Navy Department, Washington, D. C.

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OFFICE OF SUPERINTENDING CONSTRUCTOR U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., July 15, 1891.

SIR: In compliance with the Bureau's request of 26th ultimo, No. 7107, I have the honor to submit the following report of the state of work on cruiser No. 11, building at the City Point Works, South Boston, Mass.

Vertical keel: Complete.
Flat keel plates: Complete.
Stem: Complete except riveting to outside plating.
Stern post: Lower piece complete; upper piece in place.
Rudder: Pattern made but not shipped to foundry.
Transverse frames: Below water-tight deck, complete from stem to No. 91, and abaft No. 91 complete to platform; above water-tight deck, complete from stem to stern post.
Deck beams: Gun deck beams, hatches, and carlings about 80 per cent fitted.
Watertight deck beams: Beams, hatches, and carlings about 90 per cent complete.
Berth deck beams: Forward berth deck complete.
Poop and forecastle deck beams: Forecastle beams about half complete.
Beams to platform deck: Ninety per cent complete.
Skid beams for boats: Ordered.
Water courses: Cut but need trimming in some cases.
First longitudinal: Complete except under engine foundation.
Second longitudinal: Complete except under forward and after magazines.
Third longitudinal: About 90 per cent complete.
Fourth longitudinal: Complete except in wake of shaft tube.
Fifth longitudinal: Complete.
Flat keelson plates: Complete.
Outside plating: Plating up to gun deck complete from stem for about three-fourths of the length, including doubling strakes. Plating aft not fitted, in order to facilitate fitting of castings for struts, etc.
Center line bulkhead: About one-half fitted.
Transverse watertight bulkheads: Below watertight deck, about two-thirds fitted; above watertight deck about one-half fitted.
Coal bunker and other fore and aft bulkheads: About one-half fitted above water-tight deck, and commenced below.
Passage in coal bunkers: Nothing done, owing to prospective changes to accommodate engineer's fans.
Water-tight deck: Complete from stem to frame No. 91, except riveting left out of the parts to be removed for shipping boilers.
Girder to water-tight deck: Complete.
Bilge keel: Angles for same being worked.
Shaft tube and struts: Shaft tube being made; struts and end castings on hand.
Water-tight doors: Castings for a few of these have been received.
Engine, boiler, and shaft bearers: Engine bearers commenced; boiler bearer complete except top angles.
Deck stringers and plating: Forecastle and poop decks not commenced.
Gun decks and stringers and plating: Stringers and plating about 60 per cent fitted.
Berth deck stringers and plating: Stringers and plating about half fitted on forward berth deck.
Breast hooks: Parts out but not fitted in place.
Platforms: Forward platform, plating in place but not riveted; staples nearly complete; after platform complete from stern post to No. 91, and a few plates in place forward of this.
Stanchions in hold, etc.: Plan approved, no work done.
Gutters on gun deck: Commenced.
Deck plank: Material not received.
Hammock berthing: Frames being made.
Freeing ports: Nothing done.
Portable coal chutes: Nothing done.
Torpedo arrangements: Bow and stern tubes on hand and rough bored.
Sponsons for guns: Plans approved and templates for armor being made.
Gun supports: Commenced.
Mast partners: Commenced.
Hatch coamings and skylights: Cast steel water-tight hatches being made; no work on skylights.
Air ports: All castings made and two machined.
Awning stanchions: Not started.
Deck lights: All castings made and on hand.
Boat davits and cradles: Nothing done.
Cofferdams: Fore and aft cofferdams nearly complete, except top and riveting.

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Windlass and capstan: Nothing done; windlass and capstan not ordered.
Steering apparatus: Detailed design approved, but nothing else done. Steering engine not ordered.
Chain lockers: Hatches framed.
Trunks to coal bunkers: Holes cut in decks.
Magazines and shell rooms: Side and bottom plating of forward magazine and shell rooms being fitted; stapling on bulkheads fitted.
Draining and pumping arrangement: Manifolds made.
Ventilation: Plans approved; nothing else done.
Sluice valves, pipes: Sluice valves all made, but not fitted in place.
Fireman's washroom: Steelwork half completed.
Painting: Outside bottom one-third primed.
Installation of electric lights: Nothing done.
On the items omitted from this report no work has been done.
Weight in hull June 30, 1891, $322\frac{104}{2240}$ tons.
Cruiser No. 11 will probably be ready for the contractors' trial in August, 1892, and for final delivery to the Government in October of the same year.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. N.,
Chief Bureau of Construction and Repair.

OFFICE SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., July 9, 1891.

SIR: In compliance with the Bureau's request of 26th ultimo, No. 7107, I have the honor to submit the following report of the state of work on steam tug No. 1, building at the City Point Works, South Boston, Mass.:

Keel: Complete.
Stem: Complete except riveting to outside plating.
Stern frame: Complete, except riveting to outside plating.
Transverse frames, reverse frames, floor plates: Complete.
Keelsons: Complete.
Bilge stringer: Complete.
Deck beams: Main deck, complete; berth deck, complete.
Main-deck stringer, tie plates, and plating: Ninety per cent complete.
Berth-deck stringers: Not fitted.
Outside plating: About 80 per cent fitted.
Bulwark plating: Being worked.
Engine foundations: Girders complete; foundation plates not fitted.
Transverse bulkheads: Complete, except calking.
Coal-bunker bulkheads: Bounding angles fitted and plates being fitted.
Trimming tanks: About 70 per cent complete.
Joinerwork: Material in the yard, and work is proceeding on the pilot and deck houses.
Painting: Inside of hull about two-thirds primed.
Weight of hull June 30, 1891, $43\frac{621}{2240}$ tons.
This vessel will probably be ready for the contractors' trial about December 1,1891, and for final delivery to the Government December 20,1891.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. N.,
Chief Bureau of Construction and Repair.

OFFICE SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., July 9, 1891.

SIR: In compliance with the Bureau's request of 26th ultimo, No. 7107, I have the honor to submit the following report of the state of work on steam tug No. 2, building at the City Point Works, South Boston, Mass.:

Keel: Complete.
Stem: Complete, except riveting to outside plating.
Stern frame: Complete, except riveting to outside plating.

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Transverse frames, reverse frames, floor plates: Complete.
Keelsons: About half fitted.
Bilge stringer: About half fitted.
Deck beams: Main-deck beams complete. Berth-deck beams not yet fitted.
Main-deck stringer, tie plates, and plating: About two-thirds fitted.
Outside plating: Seventy per cent fitted.
Engine foundation: Commenced.
Transverse bulkheads: All plates fitted but not yet riveted.
Trimming tanks: About 60 per cent complete.
Joinerwork: Material in the yard, and work is proceeding on the pilot and deck houses.

Weight in hull June 30, 1891, $33\frac{2}{240}\frac{4}{8}$ tons.

Steam tug No. 2 will probably be ready for the contractors' trial about December 1, and for final delivery to the Government December 20, 1891.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. N.,
Chief Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., July 9, 1891.

SIR: In compliance with the Bureau's request of 26th ultimo, No. 7107, I have the honor to submit the following report of the state of work on steam tug No. 3, building at the City Point Works, South Boston, Mass.:
Keel: Complete, except riveting.
Stem: Complete, except riveting.
Stern frame: Complete, except riveting.
Transverse frames, reverse frames, floor plates: Complete, except intermediate frames, frames forward, and cant frames aft.
Deck beams: Main deck, now being fitted; berth deck, not commenced.
Outside plating: Garboards worked, and C strake started.
Joinerwork: Material in the yard, and work is proceeding on the pilot and deck houses.

Weight in hull June 30, 1891, $16\frac{141}{240}$ tons.

Steam tug No. 3 will probably be ready for the contractors' trial about February 1, 1892, and for final delivery to the Government March 1, 1892.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor, T. D. WILSON, U. S. N.,
Chief Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
BATH IRON WORKS,
Bath Me., August 1, 1891.

SIR: In compliance with the Bureau's letter, No. 7107, dated June 26, 1891, I respectfully submit the following as to the condition of work on Gunboat No. 5, following the items given by headings in specifications as near as can be estimated:

Flat keels: Erected.
Vertical keel: Erected.
Stem: Erected.
Stern post: Erected.
Stern frames: Erected.
Rudder: Frame in contractors' yard, worked.
Transverse frames: Erected.
Platform beams: Partly erected.
Poop-deck beams: Erected.
Forecastle deck beams: Erected.
Gun-deck beams: Erected.
Berth-deck beams: Forward, erected; aft, not erected.
Half beams and carlings: Partly erected.
Skid beams: (For boats), in contractors' yard.

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Longitudinals, first, second, and third: Erected.
Outside plating: Nearly completed.
Gun-deck plates and stringers: Partly erected.
Berth-deck stringers: In contractor's yard; not any erected.
Water-tight deck: Erected.
Platforms.
Steering flats: Erected.
Plating to bottom of magazines, shell rooms, and dynamo rooms.
Forward magazine: Erected.
After magazine: Partly erected.
Shell room: Partly erected.
Dynamo room: Partly erected.
Coal bunkers and other fore-and-aft bulkheads.
Hold longitudinal coal bunker: Erected.
Passageway bulkhead: Erected.
Transverse bulkheads below water-tight deck: Erected.
Stanchions: Material in contractor's yard.
Sponsons: Partly erected.
Cofferdams: Material in contractors' yard; nothing done.
Platforms for guns: Material in yard; nothing done.
Gutter bars: Erected.
Engine foundation: Erected.
Shaft tubes. Erected.
Strut brackets: In contractors' yard; not erected.
Hammock berthing: Material in yard; not erected.
Freeing ports: Covers cast.
Portable coal-bunker bulkhead: Material in contractors' yard.
Portable coal chutes: Material in contractors' yard; nothing done.
Port shutters: Material in contractors' yard; nothing done.
Mooring staples: Nothing done.
Water-tight doors: Material in contractors' yard; being worked.
Water course: Cut.
Hatch coamings: Partly erected.
Canopies: Nothing done.
Mast partners: Material in contractors' yard; nothing done.
Mast steps: Nothing done.
Manger: Material in contractors' yard; nothing done.
Galley house: Partly erected.
Coaling trunks: Material in contractors' yard; nothing done.
Coal scuttles: Gratings and covers cast.
Chain locker: Erected.
Water tanks: Material in contractors' yard; nothing done.
Passages: Partly erected.
Ash chutes: Nothing done.
Scuppers: Casting made, ready to be erected.
Bilge keel: Material in contractors' yard; nothing done.
Windlass bed: Material in contractors' yard; nothing done.
Windlass and capstan: Nothing done.
Torpedo arrangements: Nothing done.
Magazines: Forward magazine partly completed; after magazine partly completed
Shell rooms: Material being worked.
Fixed-ammunition rooms: Material in contractors' yard; being worked.
Torpedo stowage: Nothing done.
Passing scuttles: Material in contractors' yard; nothing done.
Ordnance workshop: Material being worked.
Engineer's workshop: Material being worked.
Fireman's wash-room: Nothing done.
Ceiling in hold, storerooms, etc.: Nothing done.
Drainage and pumping arrangements: Nothing done.
Trimming tanks: Forward one completed, except cementing; after one, nothing done.
Sounding tubes: Nothing done.
Sluice valves, pipes: Fitting sluice valves; pipes, nothing done.
Ventilation: Nothing done.
Forced draft in fire room: Nothing done.
Air ports and deck lights: Castings made ready to be fitted on vessel.
Deck pipes: Nothing done.
Hawse pipes: Nothing done.
Bow stoppers: Castings made; not erected.
Warping pipes: Nothing done.
Warping or towing bitts: Portion of them cast.

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Steel-wire cable nippers: Partly completed.
Ringbolts in deck: Nothing done.
Eyebolts in beams: Nothing done.
Billboards: Nothing done.
Anchor davits: Nothing done.
Boat davits and cradles: Nothing done.
Hatch cranes: Nothing done.
Sea steps: Nothing done.
Iron rounds of ladders: Nothing done.
Steering arrangements: Forgings and castings partly completed.

JOINER WORK.

Wooden pilot house: Completed; ready to be erected in vessel.
Mahogany hatch coamings: Partly completed.
Plank-sheer or waterway: Material in contractors' yard; nothing done.
Deck plank: poop, forecastle, gun, and berth decks; Material in contractors' yard.
Ceiling in holds, storerooms: Material in contractors' yard.
Sail room: Material in contractors' yard.
General storerooms: Material in contractors' yard.
Wood flooring in coal bunkers: Material in contractors' yard.
Ladders to hatchway and side: Partly completed.
Chronometer and compass lockers: Material in contractors' yard.
Wardroom: Fore and aft bulkheads to staterooms, overhead paneling, cornices, berth fronts, berths, blinds, and spiral stairs, ready to be erected in vessel.
Junior officers' quarters: Folding berths or locker seats, drawers under same, shelves, casing to water-tight bulkheads, panelings to underside of decks, etc., ready to be erected in vessel.
Cabins under poop deck: Athwartship steel water-tight bulkhead, wood casing for same; bulkheads to armory; navigators' and executive officers' office, and all sash and blinds ready to be erected.
Pantries: Refrigerating room, paymaster's office, dispensary, water-closets, lavatories for officers and crew, lamp room, armory, master-at-arms' locker, shot and musket racks: Material in contractors' yard, being worked.
Electric-light plant: Nothing done.
Speaking tubes: Nothing done.
Mechanical telegraph: Nothing done.
Oil tanks: Nothing done.
Prisons: Nothing done.
Lumber irons: Nothing done.
Hammock hooks: Nothing done.
Mess and clothes lockers for crew: Nothing done.
Swinging tables and benches for crew: Nothing done.
Signal lockers: Nothing done.
Reels: Nothing done.
Bridge: Nothing done.
Watch bell: Nothing done.
Awning stanchions: Nothing done.
Guard rail and stanchions: Nothing done.
Jacob's ladders: Nothing done.
Attachments for rigging, chain plates, bolts: Nothing done.
Chocks for fair-leaders: Nothing done.
Pin rail: Nothing done.
Brass rubbing plates: Nothing done.
Brass label plates: Nothing done.
Lashing bolts and shackles for securing guns: Nothing done.
Life buoys: Nothing done.
Swinging booms: Nothing done.
Ensign staff: Nothing done.
Figures for draft of water: Nothing done.

Nine-twentieths of the contract is completed, and it is estimated by the contractors that the remainder will be completed in eight months.

In the opinion of the contractors gunboat No. 5 will be ready for the contractors' trial in eight months, and final delivery to the Government in nine months.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. N., Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

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OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
BATH IRON WORKS,
Bath, Me., August 1, 1891.

SIR: In compliance with the Bureau's letter No. 7107, dated June 26, 1891, I respectfully submit the following as to the condition of work on Gunboat No. 6, following the items given by headings in specifications as near as can be estimated:
Flat keels: Partly erected.
Vertical keel: Partly erected.
Stem: Erected.
Stern post: Casting in contractors' yard; ready to be erected.
Rudder: Frame in contractor's yard; worked.
Transverse frames: Partly erected.
Platform beams: Material in contractor's yard; being worked.
Poop-deck beams: Worked; ready to be erected.
Gun-deck beams: Partly erected.
Forecastle deck beams: Worked; ready to be erected.
Berth-deck beams: Material in contractors' yard being worked.
Half-beams and carlings: Partly erected.
Skid-beams (for boats): Material in contractors' yard. Nothing done.
Longitudinals: 1st, 2d, and 3d partly erected.
Outside plating: Partly completed.
Gun-deck plating and stringers: Partly erected.
Berth-deck stringers: Material in contractors' yard. Not any erected.
Water-tight deck: Partly erected.
Platforms: Material in yard being worked.
Plating to bottom of magazines: Shell rooms and dynamo rooms.
Forward magazine, after magazine: Partly erected.
Shell-room: Partly erected. Dynamo room: Partly erected.
Coal bunkers and other fore and aft bulkheads:
Hold longitudinal coal bunker: Partly erected.
Passaway bulkhead: Partly erected.
Transverse bulkheads below watertight deck: Partly erected.
Stanchions: Material in contractors' yard. Nothing done.
Sponsons: Partly erected.
Coffer-dams: Material in contractors' yard. Nothing done.
Platforms for guns: Material in contractors' yard. Nothing done.
Gutter bars: Partly erected.
Engine foundation: Partly erected.
Stern frames: Partly erected.
Shaft tubes: Partly erected.
Strut brackets: In contractors' yard. Not erected.
Hammock berthing: Material in contractors' yard. Not erected.
Freeing ports: Covers cast.
Portable coal-bunker bulkheads: Material in contractors' yard.
Portable coal chutes: Material in contractors' yard. Nothing done.
Port shutters: Material in contractors' yard. Nothing done.
Mooring staples: Nothing done.
Water-tight doors: Material in contractors' yard; being worked.
Water course: Cut.
Hatch coamings: Partly erected.
Canopies: Nothing done.
Mast partners: Material in contractors' yard. Nothing done.
Mast steps: Nothing done.
Manger: Material in contractors' yard. Nothing done.
Galley house: Material in contractors' yard; being worked.
Coaling trunks: Material in contractors' yard; being worked.
Coal scuttles: Gratings and covers cast.
Chain lockers: Partly erected.
Water tanks: Material in contractors' yard; being worked.
Passages: Material in contractors' yard; being worked.
Ash chutes: Nothing done.
Scuppers: Castings made.
Bilge keels: Materials in contractors' yard. Nothing done.
Windlass bed: Material in contractors' yard. Nothing done.
Windlass and capstan: Nothing done.
Torpedo arrangement: Nothing done.
Magazine: Forward, partly completed; after, partly completed.
Shell room: Material being worked.
Fixed ammunition room: Material in contractors' yard; being worked.
Torpedo stowage: Nothing done.

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Passing scuttles: Material in contractors' yard. Nothing done.
Ordnance workshop: Material being worked.
Engineers' workshop: Material being worked.
Firemen's washroom: Nothing done.
Ceiling in holds, store rooms, etc.: Nothing done.
Drainage and pump arrangements: Nothing done.
Trimming tank: Forward one, partly completed; after one, nothing done.
Sounding tubes: Nothing done.
Sluice valves, pipes: Fitting sluice valves; pipes, nothing done.
Ventilation: Nothing done.
Forced draft in fireroom: Nothing done.
Air ports and deck lights: Castings made ready to be fitted on vessel.
Deck pipes: Nothing done.
Hawse pipes: Nothing done.
Bow stoppers: Not erected; casting made.
Warping pipes: Nothing done.
Warping or towing bitts: Portion of them cast.
Steel-wire cable nippers: Partly completed.
Ring bolts in deck: Nothing done.
Eye bolts in beams: Nothing done.
Bill boards: Nothing done.
Anchor davits: Nothing done.
Boat davits and cradles: Nothing done.
Hatch cranes: Nothing done.
Sea steps: Nothing done.
Iron rounds of ladders: Nothing done.
Steering arrangements: Forgings and castings partly completed.

JOINER WORK.

Wooden pilot house: Completed; ready to be erected in vessel.
Mahogany hatch coamings: Partly completed.
Plank sheer or waterway: Material in contractors' yard. Nothing done.
Deck plank: Poop, forecastle, gun and berth decks; material in contractors' yard.
Ceiling in holds, store rooms: Material in contractors' yard.
Sail room: Material in contractors' yard.
General storeroom: Material in contractors' yard.
Wood flooring in coal bunkers: Material in contractors' yard.
Ladders to hatchway and side: Partly completed.
Chronometer and compass locker: Material in contractors' yard.
Wardroom: Fore and aft bulkheads to staterooms, overhead paneling, cornices, berth fronts, berths, blinds, and spiral stairs, ready to be erected in vessel.
Junior officers' quarters: Folding berths or locker seats, drawers under same, shelves, casing to water-tight bulkheads, paneling to under side of deck, etc., ready to be erected in vessel.
Cabin under poop deck: Athwartship bulkhead; wood casing for same; bulkheads to armory; navigator's and executive officer's office, and all sash and blinds, ready to be erected in vessel.
Pantries, refrigerating room, paymaster office, dispensary, water closets, lavatories for officers and crew, lamp room, armory, master-at-arms locker, shot and musket racks: Material in contractors' yard, being worked.
Electric-light plant: Nothing done.
Speaking tubes: Nothing done.
Mechanical telegraph: Nothing done.
Oil tanks: Nothing done.
Prisons: Nothing done.
Lumber irons: Nothing done.
Hammock hooks: Nothing done.
Mess and clothes lockers for crew: Nothing done.
Swinging tables and benches for crew: Nothing done.
Signal lockers: Nothing done.
Reels: Nothing done.
Bridge: Nothing done.
Watch bell: Nothing done.
Awning stanchions: Nothing done.
Guard rail and stanchions: Nothing done.
Jacob's ladder: Nothing done.
Attachments for rigging, chain plates, bolts: Nothing done.
Chocks for fairleaders: Nothing done.
Pin rail: Nothing done.

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Brass rubbing plates: Nothing done.
Brass label plates: Nothing done.
Lashing bolts for securing guns: Nothing done.
Life buoys: Nothing done.
Swinging booms: Nothing done.
Ensign staff: Nothing done.
Figures for draft of water: Nothing done.

Nine-twentieths of the contract is completed and it is estimated by the contractors that the remainder will be completed in eight months.

In the opinion of the contractors, gunboat No. 6 will be ready for contractors' trial in eight months, and final delivery to the Government in nine months

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. Navy,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
BATH IRON WORKS,
Bath, Me, August 1, 1891.

SIR: In compliance with the Bureau's letter, No. 7107, dated June 26, 1891, I respectfully submit the following as the condition of work on harbor-defense ram No. 1. Following the items given by headings in specifications as near as can be estimated:
Flat keels: Partly erected.
Vertical keel: Material in contractor's yard being worked.
Stem: Patterns being made.
Rudder post: Nothing done.
Rudder: Nothing done.
Shaft tubes and struts: Nothing done.
Longitudinals: Material in contractor's yard being worked.
Greater portion of material for frames, floor plates, outside plating, bulkheads, inner bottom, girder plates, flat keelson, trimming tanks, hatch coamings, etc., in the contractor's yard.

One-twentieth of the contract is completed and it is estimated by the contractors that the remainder will be completed in nine months.

In the opinion of the contractors the harbor-defense ram No. 1 will be ready for the contractor's trial and final delivery to the Government in about ten months.

Very respectfully,

J. B. HOOVER,
Naval Constructor, U. S. N., Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
Elizabethport, N. J., August 1. 1891.

SIR: In obedience to the Bureau's No. 7107, of June 26, 1891, I beg to submit the following report of the state of the "steel practice vessel" upon July 1, 1891:
Vertical keel: Finished.
Stem: Finished.
Stern post: Finished.
Rudder: Forging completed.
Shaft tubes and struts: Ordered.
Transverse frames: All frames from No. 1 to No. 102 erected.
Engines, boilers, and shaft bearers: Boiler bearers one-third done; engine bearers, transverse framing finished.
Breast hooks: Finished.
Longitudinals: The first longitudinal in place between frames No. 17 and No. 75, and partly riveted. The second longitudinal in place between frames No. 7 and No. 83, and between frames No. 7 and No. 61, partly riveted. The third longitudinal in place between frames No. 7 and No. 95, and partly riveted.
Rider plates: Starboard side nearly finished from frame No. 7. The port side from frame No. 7 to frame No. 56, one-half.

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OUTSIDE PLATING.

Strake A: Erected forward of frame No. 73, one-half, and abaft frame No. 82, one-half, and riveted.
Strake B: Erected forward of frame No. 69, one-half, and abaft frame No. 96, one-half, and riveted.
Strake C: Erected forward of frame No. 72, one-half, and abaft frame No. 83, one-half, greater part riveted.
Strake D: Erected forward of frame No. 75, one-half, and riveted.
Strake E: Erected and about two-thirds riveted.
Strake F: Erected forward of frame No. 99, one-half, and two-thirds riveted.
Strake G: Erected forward of frame No. 66, one-half, and one-half riveted.
Strake H: Erected forward of frame No 60, one-half, and one-half riveted.
Strake J: Erected forward of frame No 41, one-half, not riveted.
Forecastle and poop-deck beams: All but two of the forecastle-deck beams bolted in position. Poop-deck beams ready for erection.
Main-deck beams: Erected between frames No. 3 and No. 79.
Berth-deck beams: Erected forward of frame No. 35 and abaft frame No. 79.
Water-tight deck beams: Completed.
Half beams and ledges: The half beams in forward berth deck, main deck, and amidships, water-tight deck, and after-berth deck, erected. Ledges in forward-berth deck and water-tight deck erected.
Main-deck stringers and tie plates: Stringers bolted in position from frame No. 79 forward. Tie plates bolted in position from frame No. 33 forward.
Berth-deck stringers and plating: Stringers from frame No. 33 forward in position, staples fitted and partly riveted. Plating forward of frame No. 7 riveted.
Water-tight deck plating: All fitted and about one-half riveted.
Water-tight flats: From frame No. 69 to frame No. 95 fitted and nearly riveted; from frame No. 95 aft completed.
Transverse water-tight bulkheads.—No. 7: Up and riveted, also numbers 14, 19, 27, and 30. No. 33: Erected; riveted below main deck. No. 38: Erected and nearly riveted. No. 43: Erected and riveted below water-tight deck, and bolted in place above. No. 52: Riveted. No. 61: Nearly all riveted below water-tight deck, and partly bolted together above. No. 68: Bolted in place. No. 71: Bolted in place. No. 74: Nearly all riveted. No. 79: Nearly all riveted. No. 89: Partly riveted.
Coal bunker bulkheads: Below water-tight deck about one-third erected and partly riveted.
Chain lockers: The sides of both lockers and after end of port locker bolted in place.
Cofferdams: All but seven frames, from frame No. 33 to frame No. 67, bolted in place, and the angle fastening cofferdam bulkhead to water-tight deck riveted in place.
Top plate bolted in place between frame No. 33 and frame No. 43.
Deck plank: Ordered.
Magazines: About half of the fore and aft bulkheads of both magazines bolted in place.
Fixed ammunition rooms: About half of the fore and aft bulkheads bolted in place.
Trimming tanks: The forward one finished, except fitting manhole. Some of the hull plating in wake of the after one, not erected.

The amount of metal material worked into the hull to July 1 was 154.2 tons, and the amount of available metal material in the yard of the contractors was 139.4 tons. No wood material had been received at that date.

I estimate that 44 per cent of the hull work under the contract was completed July 1, 1891.

In my opinion, and to the best of my judgment, the "steel practice vessel" should be ready for trial by June 1, 1892, and ready for final delivery by July 15, 1892.

Very respectfully, your obedient servant,

D. W. TAYLOR,
Assistant Naval Constructor, U. S. Navy,
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

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APPENDIX L.

SUPPLEMENTARY REPORTS SHOWING THE CONDITION OF WORK ON VESSELS BUILDING OR COMPLETING AT NAVY-YARDS OR UNDER CONTRACT ON OCTOBER 1, 1891.

PROGRESS OF WORK ON VESSELS SINCE JULY 1, 1891.

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, October 2, 1891.

SIR: Referring to letter from Bureau of Construction and Repair of 24th ultimo, No. 10830, relative to progress of work on vessels at this yard since July 1, last, I have to submit the following report:

MAINE.

Work on this vessel has been confined principally to superstructures, bulkheads on main deck, barbette angle stiffeners, steering gear, etc.

It is estimated that 63 per cent of this vessel is completed.

Time required to complete, nineteen months, unless delayed by want of material.

PURITAN.

Owing to other jobs requiring a large number of men, some of whom had to be taken from this vessel, the only work done since July 1 has been on armor shelf, which has advanced 40 per cent now being 65 per cent completed, and outer course of deck armor.

The time required to complete this vessel, providing the armor and other material is received as wanted, will be twenty months.

TERROR.

Armor backing on this vessel has advanced 20 per cent and is now 65 per cent completed.

After turret shell has been placed in position, military mast is now nearly ready to step; superstructure side and deck framing and plating is 80 per cent completed.

Work has been in progress on hatches over machinery, etc.

It has been necessary to take workmen off this vessel for other duty during the past month, more especially shipwrights, and consequently general progress has been delayed.

Estimated time to complete this vessel, providing there is no delay in delivery of material, is sixteen months.

MIANTONOMOH.

The principal work on this vessel done since July 1 has been painting, fitting additional chocks under 6-pounder guns; stowing anchors, battle hatches, etc.; trimming coamings round turret bases; repairing plank sheer, etc.

Time required for final completion will be fifty days after both forward guns are in position.

CINCINNATI.

Work on this vessel since July 1 embraces that on bilge keels, shaft struts, framing above protective deck, upper-deck framing and plating, protective deck plating, cofferdams at sides on protective deck; bulkheads, air ports, rudder, etc.

I estimate that the work on this vessel has advanced since July 1 4½ per cent and is now 40 per cent completed.

Time required to complete hull and fittings under cognizance of this Department is about eighteen months, unless delayed by want of material.

Very respectfully, your obedient servant,

F. L. FERNALD, U. S. N.,
Naval Constructor.

COMMANDANT NAVY-YARD AND STATION,
New York.

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NAVAL CONSTRUCTOR'S OFFICE, U. S. NAVY-YARD,
Norfolk, Va., October 1, 1891.

SIR: In obedience to the order of the Bureau of Construction and Repair, No. 10828, dated September 24, 1891, I have the honor to submit the following report stating generally the work done on each of the ships now building at this yard since my report of July 1, 1891, with a statement of the total percentage of the work now completed, based on the vessels fitted out and ready for sea, and their probable time of completion.

U. S. S. TEXAS.

Completed and in place: Rudder, struts, sea valves, 14-inch main drains and valves, 6-inch auxiliary drains and valves.
Plating, outside: Four-tenths fitted, three-tenths riveted.
Plating, upper deck: Three-tenths fitted, four-tenths riveted.
Plating, main deck: Two-tenths fitted, three-tenths riveted.
Plating, protective deck: Two-tenths fitted, two-tenths riveted.
Plating, lower deck: All fitted, four-tenths riveted.
Plating, platform deck: One-tenth fitted.
Turrets: Framing of forward one-tenth fitted.
Water-tight doors: Fourteen fitted in ship, seventeen made in shop.
Sluice valves: Eight fitted.
Drainage: Four-inch auxiliary drains and manifolds seven-tenths fitted.
Stiffening rings for engineers' valves: Eight-tenths fitted.
Bulkheads above protective deck: Two-tenths fitted.
Hatch doors in protective deck: Three-tenths fitted.
Stanchions above protective deck: Three-tenths fitted.
Sponsons: Three-tenths fitted.
Steering gear: Four-tenths fitted in ship.

Total weight placed in ship since July 1, 273 tons. Total weight now in ship, 1,840 tons.

Probable date of completion, December 31, 1893.

Fifty per cent of work completed on vessel, fitted out and ready for sea.

U. S. S. RALEIGH.

Completed: Six-inch auxiliary pipes and valves, all sea valves.
Plating, outside: Four-tenths fitted, three-tenths riveted.
Plating, poop and forecastle: Nine-tenths fitted, two-tenths riveted.
Plating, gun deck: Two-tenths fitted, two-tenths riveted.
Plating, berth deck: Nine-tenths fitted, two-tenths riveted.
Plating, protective deck: One-tenth fitted, three-tenths riveted.
Struts: Port fitted and nine-tenths drilled; starboard fitted and five-tenths drilled.
Bulkheads above protective deck: One-tenth fitted, two-tenths riveted.
Stanchions: Under berth deck, four-tenths fitted; above, six-tenths fitted.
Sponsons: Four-tenths fitted.
Water-tight doors: One-tenth made.
Hammock netting frames: Seven-tenths fitted.
Cofferdams: Three-tenths fitted; six-tenths riveted.
Bilge keels: Port, wood filling in place, six-tenths riveted; starboard, wood filling seven-tenths fitted, three-tenths riveted.
Drainage: Three-inch auxiliary pipes and valves, four-tenths fitted.
Air ports: Two-tenths cut.
Manholes: Seven-tenths fitted.
Stiffening rings to engineers' valves: Eight-tenths fitted.
Six-inch gun supports: Three-tenths fitted.
Shaft tubes: One-tenth fitted; two-tenths riveted.
Stem: Three-tenths completed.
Stern post: Three-tenths completed.
Trimming tank aft: Two-tenths completed.

Probable date of completion, December 31, 1891. Fifty-five per cent of work completed, based on vessel fitted out and ready for sea. Total weight placed in ship since July 1, 219 tons. Total weight now in ship, 960 tons.

U. S. MONITOR AMPHITRITE.

Stanchions: One-tenth fitted.
Berth deck plating: One-tenth fitted, two-tenths riveted.
Superstructure: One-tenth fitted, two-tenths riveted.

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Bulkheads: One-tenth fitted, one-tenth riveted.
Hammock berthing: Four-tenths fitted, nine-tenths riveted.
Mast: Six-tenths made.
Water-tight doors: Six-tenths made.
Superstructure deck-planking: One-tenth fitted.
Belt armor backing: One-twentieth fitted.
Hatch coamings: One-tenth fitted.
Air-ports: Seven-tenths cut.
Hawse pipes: Two-tenths fitted.
Turrets: Forward supports one-tenth fitted; barbette plating, three-tenths fitted, seven-tenths riveted. Aft supports, three-tenths fitted; barbette plating, nine-tenths fitted, all riveted.
Probable date of completion, June 30, 1893.
Thirty per cent of work completed, based on vessel fitted out and ready for sea.

Very respectfully,

FRANCIS T. BOWLES,
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER,
U. S. Navy, Commandant.

Respectfully submitted to the Chief of Bureau of Construction and Repair.

A. W. WEAVER,
Commodore, Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-yard, Mare Island, Cal., October 1, 1891.

SIR: In obedience to the telegraphic order of the Bureau of Construction and Repair, of the 24th ultimo, I have the honor to submit the following supplementary report of the condition of the work on the *Monadnock* as follows:

Main-deck armor plating: Completed, except plates around side lapping over side armor, none of which are fitted; riveting and calking in wake of boiler opening not to be done until after engines and boilers are on board; armor gratings, shutters, and water-tight scuttles not commenced.
Berth-deck plating: The working and laying of the berth-deck plating is completed and it is partly riveted and calked; the greater part of the bulkhead and hatch iedges are completed and riveted.
Transverse bulkheads: No. 17, erected, but not riveted or calked; No. 34, erected, but not riveted or calked; No. 38, completed; No. 47, erected, except casing for companionway through bulkhead, which is partly fitted, bulkhead riveted, and partly calked; No. 57, erected, but not riveted or calked.
Bulkhead No. 68: Erected, but not riveted or calked.
Bulkhead No. 77: Erected, but not riveted or calked.
Bulkhead No. 86: Erected, excepted casing for companionway through bulkhead, which is partly fitted, but not riveted or calked.
Bulkhead No. 97: Erected, but not riveted or calked.
Bulkhead No. 110: Erected, but not riveted or calked.
Fore and aft bulkheads: Longitudinal passageway bulkhead, greater part erected; supporting brackets under flat completed, and water-tight staples on armor deck beams not yet fitted.
Longitudinal coal bunker bulkheads are erected and partly riveted, but not calked. Longitudinal shaft alley bulkheads completed.
All of the longitudinal passageway door-frames are completed, but not riveted.
Water-tight doors: Shaping of frames and half-round moldings nearly completed.
Superstructure framing: Bars are completed and riveted; bottom angle connecting plating to armor deck, completed and riveted, except the two ends.
Superstructure deck-beams: Are completed and riveted, except in wake of boiler opening.
Superstructure plating: The outside superstructure plating is completed and riveted to bottom angle on armored deck, butt straps completed, and a greater part of the seam straps in place.
Superstructure deck stringer plates: Are completed and riveted.
Superstructure half beams: Are completed and riveted.
Skid beams: Completed and partly riveted.
Hammock berthing: Bottom angles connecting the outside plating to the stringer plating completed, but not riveted or calked. The hammock-berthing angle frames are being worked, 7 have been erected and 4 hammock berthing plates erected on the starboard side and 3 on the port.
Magazines: Forward and after magazine bulkheads are completed.
Shell rooms: Forward and after shell-room bulkheads are completed.

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Handling room: Forward handling-room bulkhead partly erected; after handling-room bulkhead completed.
Barbette turrets: Patterns for steel racks and roller paths completed. Turret support plates, stiffeners, and seam straps erected in both forward and aft turrets, but not riveted or calked.
Belt armor: Side lined off and templates prepared.
Water tanks: Forward water-tank bulkheads partly erected.
Testing water-tight tanks, etc.: Two of the compartments of the double bottom have been tested and the old collision bulkhead.
Plans of proposed engine and boiler bearers with strengthening in double bottom completed.
Where the headings of paragraphs of specifications are not mentioned no work has been done included under them.
The work completed, including old work done under contract based on the final completion of the vessel and outfit, ready for sea I estimate at 50 per cent.
Vessel under repair, *Adams;* work just commenced after surveying. Preparing ship to go in dock to renew wales. Ninety-five per cent of repair work remaining to be done. Time required, three months.

Very respectfully,

J. H. LINNARD,
Naval Constructor, U. S. Navy.

Rear-Admiral JOHN IRWIN, U. S. N.,
Commandant Navy-Yard, Mare Island, California.

COMMANDANT'S OFFICE,
Navy-Yard, Mare Island, California, October 1, 1891.

Forwarded.

JOHN IRWIN,
Commandant.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
Philadelphia, October 31, 1891.

SIR: In compliance with the Bureau's order of the 25th ultimo, No. 10884, I have to submit the following supplementary statement showing the progress of work on the 4 United States vessels building at these works by the Messrs. Cramp & Sons, under my supervision:

U. S. ARMORED CRUISER, NO. 2 (NEW YORK).

	July 1.	October 1.
Rudder	Being forged	Forging nearly completed.
Deck plating, stringers, etc	Nearly completed	Very nearly completed.
Transverse water-tight bulkheads	Nearly completed below protective deck.	Nearly completed below protective deck, in place above protective deck forward and abaft machine space, but not riveted.
Stanchions between decks	Well advanced	Nearly completed.
Engine, boiler, and shaft bearers	About half completed	Well advanced.
Shaft tubes and struts	Being cast	In place and being bored out.
Water-tight doors	Commenced	Well under way.
Armor on outside of hull plating	Templets being made and some of them ready to be shipped.	Templets completed ready for shipment.
Armored barbettes and framing		
Armored tubes to same		
Armored protection to 8-inch broadside, 4-inch and R. F. guns.		
Support for 8-inch gun amidship	Foundations being prepared.	In place but not riveted.
Hatch coamings, skylights, and inclosures to same.	Well advanced	In place but not riveted up.
Bilge keels	Nearly completed	Completed.
Magazines	Metal work nearly completed forward well advanced aft.	Metal work completed forward, well advanced aft.
Passing scuttles	Holes being cut	Holes cut.
Superstructure, sides, and hammock berthing.	Commenced	Well advanced.
Scuppers	Being cut	Well advanced.
Water tanks	Commenced	Well advanced.
Firemen's wash rooms		Commenced.

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U. S. ARMORED CRUISER, NO. 2 (NEW YORK)—Continued.

	July 1.	October 1.
Lavatory for crew	Angle bars in place for bulkheads.	Well advanced.
Water-closets and urinals for crew		
Seatings for steering arrangements	Commenced	Well under way.
Ventilation	Commenced	Well under way.
Deck and hawse pipes	Commenced	Well under way.
Anchor beds	Nearly completed	Recesses in deck for bowers completed.
Planking of upper deck	Commenced	Well advanced.
Planking of berth deck		Well advanced.
Planking of gun deck		Commenced.
Protective deck plating	Very nearly completed	Completed, except 3-inch armor.
Launching ways		Completed.
Cradles		Nearly completed.

The hull work on this vessel is about six-tenths completed, and it is estimated that she will be ready for the contractors' trial and final delivery to the Government on the 1st day of April and 30th of June, 1893, respectively.

U. S. PROTECTED CRUISER NO. 12.

	July 1.	October 1.
Flat keel plates	Nearly completed	Completed.
Vertical keel	Nearly completed	Completed.
Transverse frames	Nearly all up below protective deck.	Nearly all up.
Outside plating	About two-thirds done below protective deck.	Nearly completed below protective deck.
Transverse water-tight bulkheads.	Begun	Some in place but not riveted up.
Protective deck	Commenced	Two courses of plating well under way.
Outfit: Boats	2 28-foot cutters very nearly completed, 1 28-foot cutter, keel and sternpost made and scarphed.	3 cutters, hulls complete (except a few fittings); 1 whaleboat, hull well advanced.

About three-tenths of the hull work on this vessel is completed, and it is estimated that she will be ready for contractors' trial and delivery to the Government on May 30 and August 15, 1893, respectively.

U. S. BATTLE SHIP NO. 1 (INDIANA).

	July 1.	October 1.
Flat keelson		Commenced.
Frames		51 frames up.
Plating		Commenced.
Longitudinals		Two-thirds in place.
Templates for armor		Well under way.

About one-tenth of the hull work on this vessel is completed, and it is estimated that she will be ready for the contractors' trial and final delivery to the Government on November 1, 1893, and February 15, 1894, respectively.

U. S. BATTLE SHIP NO. 2 (MASSACHUSETTS).

	July 1.	October 1.
Flat keel	One-half laid	Nearly completed.
Vertical keel	One-half laid	Nearly completed.
Flat keelson		Commenced.
Frames		51 frames up.
Plating		Commenced.
Longitudinals		Two-thirds in place.
Templets for armor		Well under way.

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About one-tenth of the hull work on this vessel is completed, and it is estimated that she will be ready for the contractors' trial and final delivery to the Government on the 1st day of December, 1893, and March 15, 1894, respectively.

Very respectfully, your obedient servant,

J. F. HANSCOME, U. S. N.,
Superintending Constructor

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF NAVAL CONSTRUCTOR,
San Francisco, Cal., October 2, 1891.

SIR: In compliance with the Bureau's order, No. 10884, of September 25, 1891, I have the honor to transmit herewith the following report of the condition of work on the armored coast-defense vessel (*Monterey*) on the 1st instant:

Vertical keel, flat keel; armor shelf; stem; sternpost; rudder; shaft tubes and struts; transverse frames; longitudinals; water courses; superstructure deck beams; main-deck beams; berth-deck beams; half beams and ledges; skid beams; outside plating; flat keelson plate; inner bottom; superstructure deck stringers, tie plates, and plating: Completed.
Main-deck plating: Completed except securing outer strake to belt armor.
Berth deck stringer, tie plates, and plating: Completed.
Engine boiler and shaft bearers: Completed.
Hammock berthing: Completed, except berthing boards.
Transverse water-tight bulkheads; coal bunkers and other fore-and-aft bulkheads; shaft alleys; water-tight doors, sluice valves, etc.: Completed.
Holes in bulkheads for engineers' pipes: being made water tight as directed.
Sounding tubes: Completed.
Chain lockers: Completed and chain stowed in same.
Stanchions in hold and between decks: Completed.
Magazines and shell rooms: Completed except stowage arrangements.
Handling rooms: Bulkheads completed, but no other work done.
Ammunition carrier: Nothing done.
Fixed ammunition rooms: Completed.
Bridges and pilot house: Bridges completed, pilot house nearly completed in shops.
Plank sheer, main deck: Fitted in place, but awaiting fitting of belt armor before being finally secured.
Superstructure deck plank: Nothing done.
Main-deck plank: Deck plank laid and about one-half calked.
Berth-deck plank: Deck plank laid and calked.
Belt armor: Templates and drawings forwarded, but no armor yet received.
Armor bolts: Drawing forwarded, but no bolts yet received.
Barbette turrets: Barbette supports on berth deck completed; barbettes on main deck completed except wood backing and armor; lower roller paths, roller, and roller rings in place; upper roller paths being fitted; no work done on revolving turrets nor on arrangements for handling ammunition.
Conning tower: Drawings forwarded, but no armor yet received.
Armored smoke pipe: Completed except armor.
Wood backing: Completed for belt armor, but not yet begun for barbettes.
Ceiling in hold, storerooms, etc.: Completed.
Cabin and ward room: Bulkheads between staterooms completed; deck cleats in place; all other bulkheads, berth fronts, lockers, etc., completed in shops.
Steerage: Complete except berths and lockers.
Chronometer and compass lockers: Nothing done.
Sail or awning rooms: Completed except lignum-vitæ rollers.
Storerooms: Completed.
Paymaster's office: About one-fourth completed.
Captain's executive officer's, and navigator's offices: Nothing done.
Armory: Completed except stowage arrangements.
Sick bay: Completed except plumbing.
Dispensary: Completed except bottle racks and lockers.
Prison: Completed.
Master-at-arms' lockers: Nothing done.
Signal chest: Completed.
Engineers' log room and engineers' and ordnance workshop: Nothing done.
Pantries: Completed except shelving and plumbing.
Water closets: Plumbing well under way.

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Galley inclosure: Bulkheads and doors completed; no other work done.
Bath rooms, lavatories, and firemen's wash room: Nothing done.
Mess tables and benches: Half completed in shops.
Mess and clothes lockers: Being constructed in shops.
Lamp room: Nothing done.
Hatch coamings and skylights: Completed.
Gratings and hatch covers: Completed in shops.
Rubbing plates: Nothing done.
Awning and life-line stanchions: Completed.
Guard rails and stanchions: Bridge stanchions completed; rails not yet fitted.
Hatch cranes: Completed.
Brass label plates: Completed for all deck sockets; no others yet made.
Shot racks and musket racks, lumber irons, reels, running lights: Nothing done.
Ship's bell: Completed in shops.
Deck lights, air ports, coal and passing scuttles: Completed.
Water tanks: Completed.
Chain stoppers: Being secured in place.
Hawse pipes: Patterns completed and at foundry.
Bill boards: Completed; all anchor gear completed in shops.
Mooring bitts: Six pairs completed; two pairs not yet secured.
Warping chocks: Completed.
Military mast and mast step: Completed.
Ring bolts in deck; iron rungs or ladders: Nothing done.
Hammock hooks; eyebolts in beams: Completed.
Oil tanks: Completed in shops.
Canopies: Completed.
Swinging booms for boats: Nothing done.
Signal and ensign staffs: Completed.
Boats: Three cutters and one whaleboat have hulls completed; spars made but not fitted; awning stanchions and flagstaffs fitted; no other fittings made; gig about half planked; dingey and steam whaleboat not begun.
Boat davits, cranes, and cradles: Davits completed; cranes completed in shop; cradles half completed in shop.
Anchor davits, steam capstan, windlass bed and windlass, steam winch: Completed.
Steering apparatus: Completed below main deck.
Speaking tubes and telegraphs: Nothing done.
Drainage and pumping arrangements: Completed.
Pumps: Completed except hose, hose reels, and a few fittings.
Ventilation: Blowers in place; ventilation system almost completed.
Ventilation in coal bunkers and forced draft in fire rooms: Completed.
Electric lighting: Engines and dynamos completed; remaining work of installation about half completed.
Portable furniture: Chairs completed except upholstering; tables and other portable furniture about one-fourth completed.
Cooperage and miscellaneous outfit: Nothing done.
Figures for draft of water: Completed.
Coating decks: Main deck has been given two coats of oil.
Calking: Berth-deck plank calked, main deck one-half calked.
Cement: Completed.
Painting, etc.: Double bottom has been given two coats of red lead; under side of main deck, storerooms, magazines, and inside of hold, two coats of red lead, one coat of cork paint, one coat of white zinc and lead mixed; wood bulkheads in cabin, wardroom, etc., one coat of white lead; superstructure, one coat of red lead; outside of ship cemented and three coats of red lead.
Testing water-tight compartments; all compartments within double bottom tested and found tight.

In my opinion, the work on the hull is 85 per cent completed.

The time of the completion of the ship, so far as the hull is concerned, depends principally upon the delivery of the armor. If all the armor were now at these works, the vessel could be made ready for the contractors' trial by January 1, 1892, and could be turned over to the Government within two months after the successful completion of the trials. As none of the armor has yet been delivered here, and as I have no means of ascertaining when it may be expected, it is impossible for me to make a more definite estimate as to the time of her completion.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of the Bureau of Construction and Repair,
Navy Department, Washington, D. C.

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OFFICE OF NAVAL CONSTRUCTOR FOR U. S. NAVY,
UNION IRON WORKS,
San Francisco Cal., October 3, 1891.

SIR: In compliance with the Bureau's order, No. 10884, September 25, 1891, I have the honor to transmit herewith the following report of the condition of work on cruiser No. 6 on the 1st instant:

Flat and vertical keels: Completed.
Stem and sternpost: Patterns completed.
Rudder: Rudder stock completed, including composition casing frame being molded.
Transverse frames: All main and reverse frames within double bottom erected; twenty-two frames forward and abaft double bottom erected up to protective deck; floor plates to all above frames in place; no riveting yet done.
Longitudinals: Angle bars of first and second longitudinals in place; two plates for first longitudinals in place.
Outside plating: Nothing done.
Inner bottom: Laid off and plates ready to go in place.
Deck beams: Twenty protective deck beams in place; balance of protective deck beams bent and punched; no work done on other beams.
Bulkheads: Bulkhead No. 67 partially erected; other transverse bulkheads laid off; no work done on longitudinal bulkheads.
Deck plating: Protective deck plating nearly all straigtened and planed; no work done on plating of other decks.
Shaft struts: Patterns completed.
Masts: Forged work completed.
Pumping and drainage: Pipe flanges, sluice gates, valves, deck sockets, and many small fittings completed in shops.
Pumps: Castings all made and pumps about half completed.
Ventilation: Nothing done.
Capstan and windlass: Patterns completed.
Accommodation ladder and boat booms: Ironwork completed.
Electric lighting: Nothing done.
Water-tight doors, hatch and coal scuttles, coal-chute plugs, manhole frames and covers, steering gear, both hand and hydraulic, air ports, anchor davits, anchor gear, bitt and chocks, ship's bell, light-box covers, chain stoppers, wire hawser reels, wire hawser nippers, rail stanchions, awning stanchions: Completed in shops.

In my opinion the work on this vessel is (including hull and machinery) 35 per cent completed, including material and labor.

Considerable difficulty has been experienced in getting material for this vessel, and certain causes of delay are still in operation; but if no further delays occur she will probably be completed within the contract time.

Very respectfully, your obedient servant,

R. W. STEELE,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of the Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF NAVAL CONSTRUCTOR, U. S. NAVY,
UNION IRONWORKS,
San Francisco, Cal., October 3, 1891.

SIR: In compliance with Bureau's order No. 10884, of September 25, 1891, I have the honor to transmit herewith the following report of the condition of work on battleship No. 3 (*Oregon*) on the 1st instant:

Lines laid down.
Working drawings about 60 per cent completed.
Material, 99 per cent ordered, about 800 tons received.
A new building slip has been built, to efficiently support which it has been necessary to drive over 1,200 piles.
Staging for overhead traveling cranes erected.
Traveling cranes completed in shops and ready for erection.
All other standards and staging erected.
Keel blocks laid.
Protective deck plates being planed.

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Water-tight doors, 50 per cent completed.
Steering gear: All patterns completed, bed plate cast, several of the large forgings completed, hand gear not begun.
Manhole frames and covers 25 per cent completed.

In my opinion the work on the hull is 7 per cent completed.

Although about 800 tons of material have been received, yet this consists almost exclusively of angles and protective deck plating; no plates for flat or vertical keels, floors, longitudinals, inner or outer bottoms have been received. While considerable shop work has been done on various fittings and on machining the protective deck plating, it has thus been impossible to begin the actual construction work on the stocks. It is therefore impracticable at present to make any definite estimate as to the time of completion of this vessel, though it seems reasonably certain that she will be completed within the contract time.

Very respectfully, your obedient servant,

R. W. STEELE, U. S. N.,
Naval Constructor, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRONWORKS AND DRY DOCK COMPANY,
Baltimore, Md., October 1, 1891.

SIR: In compliance with your orders of September 25, 1891, calling for a supplementary report of the work on cruisers Nos. 9 and 10 since July 1, 1891, up to and including the 30th day of September, 1891, I have the honor to report as follows for cruiser No. 9:

SUPPLEMENTAL REPORT, CRUISER No. 9.

The following subjects pertaining to the hull of cruiser No. 9 were reported July 1, 1891, as completed:
Vertical keel, flat keel, stem, stern frame, transverse frames, main-deck beams, water-tight deck beams, berth-deck beams, beams to platform decks, half beams and carlings, longitudinals, flat keelson plates, bilge keels, berth-deck stringers and plating, breasthook, windlass bed, water tanks, mast steps.

The following subjects pertaining to hull of cruiser No. 9 have been completed since last report:
Stern post, platforms, mast partners, trimming tank.

The following is the present condition of the other portions of this vessel:
Rudder: Frame and plates in yard.
Poop and forecastle deck beams: Completed except in wake of armor plate.
Skid beams for boats: Made and being fitted.
Outside plating: Completed up to gun deck; bulwark plating nearly completed.
Center line bulkhead: Completed as far as can be until the boilers are put in.
Transverse water-tight bulkheads, coal bunker, and other fore and aft bulkheads: Mostly in ship and secured as far as can be; part of the deck will have to be removed in order to put the boilers in.
Water-tight deck: All in place and riveted except over the boilers.
Girders: All in place, mostly riveted.
Shaft struts: In place.
Shaft tubes: Partly machined.
Water-tight doors: Mostly completed.
Engine, boiler, and shaft bearers: Nearly completed.
Poop and forecastle deck stringers and plating: Completed, except around gun sponsons.
Gun-deck stringers and plating: Completed, except over boilers.
Stanchions in hold and under poop and forecastle: Nearly completed.
Gutters on gun deck: Nearly completed.
Plank-sheers and waterways: Material partly shaped.
Deck plank: All on hand, laid under poop and forecastle, and laid on poop and forecastle as far as can be, until completion of gun sponsons.
Freeing ports: Framed.
Torpedo arrangements: Castings received.
Sponsons for guns: Completed as far as can be until receipt of armor.
Hatch coamings and skylights: Metal skylights not begun; woodwork for wood skylights are fitted up in shop; gratings are partly made; coamings well advanced.

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Air ports: Nearly completed; many fitted on ship.
Ladders (side): Material in yard, partly worked.
Guard rail and stanchions: Material shaped and machining well advanced.
Ladders to hatchways: Mostly made.
Galley house, bed, etc.: Steel work completed as far as possible before galley is in.
Cofferdams: Material fitted in ship and partially secured.
Hawse pipes: Port hawse pipes in place; other pipe in yard.
Windlass and capstan: Windlass in place; capstan in store.
Manger: Completed, except as to calking.
Wood pilot house: Partially built.
Chain lockers: Nearly completed.
Coal scuttles: Made in shop.
Trunks to coal bunkers: Material in yard; some in place.
Magazines: Steel work nearly completed.
Shell room: Steel work nearly completed.
Fixed-ammunition room: Steel work nearly completed.
Passing scuttles: Castings mostly finished.
Ammunition lifts: Castings mostly finished.
Drainage and pumping: Most of the pipe and fittings in the yard, some in place.
Sluice valves, pipes, etc.: Bilge sluice valves in place, other material in yard.
Ceiling in hold, storerooms, etc.: Material in yard.
Ward room: Lumber and much of the millwork in yard.
Junior officers' quarters: Lumber and much of millwork in the yard.
Cabins in poop: Lumber and much of millwork in the yard.
Chronometer and compass locker: Material in yard.
Sail room: Material in yard.
General and storerooms: Lumber in yard and partially worked.
Prisons: Metal-work nearly finished.
Swinging tables and benches: Woodwork nearly done.
Engineer's workshop: Material in yard.
Ordnance workshop: Material in yard.
Engineer's log room: Material in yard.
Pantries: Material in yard.
Refrigerating room: Lumber in yard partly worked.
Reels: Hose racks nearly completed.
Torpedo port shutters: Partly made.
Hammock hooks: In cabin, wardroom, etc., are in place.
Attachment for rigging: Chain plates in place and secured.
Deck pipes: Castings in yard and partly fitted.
Warping bits: Brass bits in shop nearly finished.
Ash chutes: In yard.
Ventilation: About one-third completed.
Paymaster's office: Sections made but not put up.
Dispensary: Sections made but not put up.
Steering apparatus: Work begun.
Calking: Decks that are laid are partly calked.
Cement: Bilges mostly cemented.
Painting steel: Cork painting in wardroom, cabin, and junior officers' quarters nearly completed.
Deck lights: Patterns under way.
Painting, graining, and polishing woodwork: Millwork, which is in yard, has been polished.

I estimate that the hull of this vessel is now fifteen-twentieths completed. As in my last report, I place the probable time of the completion of this vessel as November 1, 1892.

Very respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor, Cruisers Nos. 9 and 10.

Chief Constructor T. D. WILSON, U. S. N.,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,
Baltimore, Md., October 1, 1891.

SIR: In compliance with your orders of September 24, 1891, calling for a supplementary report of the work on cruisers Nos. 9 and 10, since July 1, 1891, up to and including the 30th day of September, 1891, I have the honor to report as follows for cruiser No. 10:

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SUPPLEMENTAL REPORT, CRUISER NO. 10.

The following subjects pertaining to the hull of cruiser No. 10 were reported July 1, 1891, as completed:

Vertical keel, flat keel, stem, stern frame, transverse frames, main-deck beams, berth-deck beams, beams to platform decks, half beams and carlings, longitudinals, flat keelson plates, bilge keels, berth-deck stringers and plating, breast-hook, windlass bed, mast steps, water tanks.

The following subjects pertaining to the hull of cruiser No. 10 have been completed since last report:

Sternpost, mast partners, shaft struts, platforms, trimming tank, shaft tubes.

The following is the present condition of the other portions of this vessel:

Rudder: Partly in place.
Poop and forecastle deck beams: Completed except in wake of armor plate.
Skid beams for boats: Made and being fitted.
Outside plating: Completed up to gun deck; bulwark plating nearly done.
Center line bulkhead: Completed as far as can be until the boilers are in.
Transverse water-tight bulkheads, coal bunker and other fore and aft bulkheads: Mostly in ship and secured as far as can be, as part of the deck will have to be removed in order to put the boilers in.
Water-tight deck: All in place and riveted, except over the boilers.
Girders: All in place, and mostly riveted.
Water-tight doors: Mostly completed.
Engine, boiler and shaft bearers: Nearly completed.
Poop and forecastle deck stringers and plating: Completed except around gun sponsons.
Gun-deck stringers and plating: Completed, except over boilers.
Stanchions in hold and under poop and forecastle: Nearly completed.
Gutters on gun deck: Nearly completed.
Plank-sheers and waterways: Material partly shaped.
Deck plank: All on hand, laid under poop and forecastle, and laid on poop and forecastle as far as can be until completion of gun sponsons.
Freeing ports: Framed.
Torpedo arrangements: Castings received.
Sponsons for guns: Completed as far as can be until receipt of armor.
Hatch coamings and skylights: Metal skylights not begun; woodwork for wood skylights are fitted up in shop; gratings are partly made; coamings well advanced.
Air ports: Nearly completed, many fitted on ship.
Ladders, side: Material in yard, partly worked.
Guard rail and stanchions: Material shaped; machining well advanced.
Ladders to hatchways: Mostly made.
Galley house, bed, etc.: Steel-work completed as far as possible before galley is put in.
Cofferdams: Material fitted in ship and partly secured.
Hawse pipes: Port hawse-pipes in place, other pipe in yard.
Windlass and capstan: Windlass in place, capstan in store.
Manger: Completed, except as to calking.
Chain lockers: Completed, except painting.
Coal scuttles: Made in shop.
Trunks to coal bunkers: Material in yard, some in place.
Magazines: Steel-work nearly completed.
Shell room: Steel-work nearly completed.
Fixed ammunition room: Steel-work nearly completed.
Passing scuttles: Castings mostly finished.
Ammunition lifts: Castings mostly finished.
Drainage and pumping: Most of the pipe and fittings in the yard, some in place.
Sluice valves, pipes, etc.: Bilge sluice valves in place; other material in the yard.
Ceiling in hold, storerooms, etc.: Material in yard.
Wardroom: Lumber, and much of the millwork in yard.
Junior officers' quarters: Lumber and millwork in yard.
Cabins under poop: Lumber and millwork in yard.
Chronometer and compass locker: Material in yard.
Sail room: Material in yard.
General and storerooms: Lumber in yard and partly worked.
Prisons: Metal-work nearly finished.
Swinging tables and benches: Woodwork nearly done.
Engineers' workshop: Material in yard.
Ordnance workshop: Material in yard.
Engineers' log room: Material in yard.
Pantries: Material in yard.

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Refrigerating room: Lumber in yard, partly worked.
Reels: Hose racks nearly completed.
Torpedo port shutters: Partly made.
Hammock hooks: In cabin and wardroom are in place.
Attachment for rigging: Chain plates in place and secured.
Deck pipes, cast: Castings in yard, and partly fitted.
Warping bitts: Brass bitts in shop, nearly finished.
Ash chutes: In yard, some in place.
Ventilation: About one-third completed.
Paymaster's office: Sections made, but not put up.
Dispensary: Sections made, but not put up.
Steering apparatus: Work begun.
Calking: Decks that are laid are partly calked.
Cement: Bilges are mostly cemented.
Painting steel: Cork painting in wardroom, cabin, and junior officers' quarters nearly complete.
Deck lights: Patterns under way.
Painting, graining, and polishing woodwork: Millwork which is in yard has been polished.

I estimate that the hull of this vessel is now fifteen-twentieths completed.

As in my last report, I place the probable time of the completion of this vessel as October 1, 1892.

Respectfully, your obedient servant,

WM. H. VARNEY, U. S. N.,
Superintending Constructor, Cruisers Nos. 9 and 10.

Chief Constructor T. D. WILSON, U. S. N.,
Navy Department, Washington, D. C.

OFFICE SUPERINTENDING CONSTRUCTOR U. S. NAVY,
CITY POINT WORKS,
South Boston, Mass., October 1, 1891.

SIR: In compliance with the Bureau's request of the 25th inst., No. 10884, I have the honor to submit the following report of the work done since July 1 last on cruiser No. 11, building at the City Point Works, South Boston, Mass.

The stern has been framed, the shaft struts fitted and secured, and the castings at the end of the stern tube and the stern tubes themselves are being fitted in place. Work on the outside plating around the stern and above the gun deck in the wake of the forecastle and poop has progressed and the outside plating is now about 80 per cent. complete. The poop deck has been framed and the stringers and ties fitted. The framing of the gun, berth and watertight decks has been completed. The transverse bulkheads above the watertight deck have been fitted complete except riveting. The plating of the magazines and shell rooms has progressed and the sponsons for the battery are being fitted. Bilge keels have been fitted complete. Breast hooks have been fitted. The hammock berthing frames have been made and fitted in place. The framing of the 6-inch gun support has been completed. The end compartments have been filled in with cement.

The hull of this vessel is now about 60 per cent. complete, allowing for the material on hand, and it will take about 12 months to complete it.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. N.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
CITY POINT WORKS,
Boston, Mass., October 1, 1891.

SIR: In compliance with the Bureau's request of the 25th instant, No. 10884, I have the honor to submit the following report of the work done since July 1 last on steam tug No. 1, building at the City Point Works, South Boston, Mass.

The outside plating has been completed, the stem and stern post riveted up complete, coal bunker bulkheads have been completed except riveting, and the engine, pillow block, and thrust bearing foundations have been completed. Holes for sea valves and air ports have been cut and the valves and ports are nearly ready to go

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in place. Chain lockers have been fitted and a gypsy windlass is being made. The main deck house and the pilot house have been built complete, except the interior of the main house, which is waiting for the boiler to be shipped. The companionway ladders and furniture are complete, ready to go in place. Freeing ports have been completed, except fastenings. The towing bitts have been completed except bolster and caps.

The cementing has been completed except in coal bunkers. The stern tube has been fitted complete and the stern shafting and propeller are now being put in place. The water tanks have been built.

The total work on the hull of this boat is now 85 per cent complete, and she will probably be completed December 20, 1891.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
CITY POINT WORKS,
Boston, Mass., October 1, 1891.

SIR: In compliance with the Bureau's request of the 25th instant, No. 10884, I have the honor to submit the following report of the work done since July 1 last on steam tug No. 2, building at the City Point Works, South Boston, Mass.

The outside plating has been completed, the stem and stern post riveted up complete, coal bunker bulkheads have been completed except riveting, and the engine, pillow block, and thrust bearing foundations have been completed. Holes for sea valves and air ports have been cut and the valves and ports are nearly ready to go in place. Chain lockers have been fitted and a gypsy windlass is being made. The main deck house and the pilot house have been built complete, except the interior of the main house, which is waiting for the boiler to be shipped. The companionway ladders and furniture are complete, ready to go in place. Freeing ports have been completed except bolster fastenings. The towing bitts have been completed except bolster and caps. The cementing has been completed except in coal bunkers. The stern tube has been fitted complete, and the stern shafting and propeller are now being put in place. The water tanks have been built.

The total work on the hull of this boat is now 85 per cent complete, and she will probably be completed December 20, 1891.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. N.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
CITY POINT WORKS,
Boston, Mass., October 1, 1891.

SIR: In compliance with the Bureau's request of the 25th instant, No. 10884, I have the honor to submit the following report of the work done since July 1 last on steam tug No. 3, building at the City Point Works, South Boston, Mass.

The outside plating, keel, stem, sternpost and stern frame have been completed. The main and berth deck framing, stringers and ties, and coal bunker bulkheads have been completed, except riveting. The transverse bulkheads have been completed. The engine, pillow block, and thrust bearing foundations have been completed. The holes for sea-valves, air ports, and freeing ports have been cut and the valves are nearly ready to go in place. The chain lockers have been fitted and a gypsy windlass is being made. The pilot house has been built complete, except interior fittings, and the sills and frame of main house have been gotten out. The rail is now being fitted. Furniture has been completed ready to go on board. The cementing has been completed except in coal bunkers. The stern tube and stuffing box has been fitted complete. The water tank has been built.

The total work on the hull of this boat is now 80 per cent complete, and she will probably be completed January 15, 1892.

Very respectfully, your obedient servant,

S. W. ARMISTEAD,
Superintending Constructor, U. S. Navy.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair.

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OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
Bath Iron Works, Bath, Me., October 1, 1891.

SIR: In compliance with the Bureau's letter No. 10884, dated September 25, 1891, relative to a supplementary report of work on gunboat No. 5 since July 1 and to October 1, 1891, I respectfully submit the following:

Flat keels, outer and inner: Completed.
Vertical keel: Completed.
Flat keelson: Completed.
Vertical keel bars: Completed.
Frames below and above water-tight deck: Completed.
Floor plates: Completed.
Reverse frames: Completed.
Longitudinals: Completed.
Boiler saddles: Completed.
Engine foundation: Completed.
Stem: Completed.
Water-tight deck: Completed.
Water-tight deck beams: Completed.
Water-tight deck brackets: Completed.
Gun deck beams: Completed.
Bulkheads: Nine tenths completed.
Forecastle deck beams: Completed.
Magazines, fore and aft: Nine-tenths completed.
Platform beams: Nine-tenths completed.
Girders: Nine-tenths completed.
Poop deck beams: Eight-tenths completed.
Gun deck plating: Nine-tenths completed.
Berth deck beams: Completed.
Gun deck stringers: Eight-tenths completed.
Shell plating: Nine-tenths completed.
Gun sponsons: Eight-tenths completed.
Stern posts: Completed.
Stern framing: Completed.
Coal bunkers and other fore-and-aft bulkheads: Nine-tenths completed.
Port shutters: Five-tenths worked.
Water-tight doors: Eight-tenths completed.
Watercourses: Completed.
Manger: Two-tenths erected.
Waterway: Nine-tenths worked.
Coal scuttles: Two-tenths worked.
Water tank; Nine-tenths worked.
Chain lockers: Eight-tenths completed.
Ash chutes: Five-tenths worked.
Engineer's workshop: Three-tenths completed.
Bilge keels: Five-tenths completed.
Sail room: Five-tenths worked.
Trimming tank forward: Completed.
Steering engine foundation: Nine-tenths completed.
Air ports and deck lights: Nine-tenths completed.
Water-tight door fittings: Nine-tenths completed.
Wire cable nipper: Nine-tenths completed.
Steering gear forgings and castings: Five-tenths completed.
Stanchions: Completed.
Struts: Six-tenths completed.
Shaft bearings: Eight-tenths completed.
Hammock berthing: Five-tenths completed.
Portable coal chutes: Five-tenths worked.
Portable coal bunkers: Six-tenths worked.
Hatch coamings: Six-tenths completed.
Mast partners: Two-tenths erected.
Galley-house bed: Six-tenths completed.
Deck plank: Nine-tenths worked.
Coaling trunk: Three-tenths completed.
Cofferdam and passages: Six-tenths worked.
Ordnance workshop: Three-tenths completed.
Firemen's washroom: Five-tenths worked.
General storeroom: Five-tenths worked.
Sluice valves, etc.: Five-tenths completed.
Rudder stock: Nine-tenths completed.
Rudder stuffing box: Nine-tenths completed.

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Water-tight hatch fittings: Nine-tenths completed.
Water-tight sliding doors: Six-tenths completed.
Chain stoppers: Nine-tenths completed.
Spare tiller: Nine-tenths completed.
Brass bits: Nine-tenths completed.
Coal-scuttle rings: Nine-tenths completed.

JOINER WORK.

Pilot house: Completed.
Poop-cabin cornices: Eight-tenths completed.
Overhead paneling: Nine-tenths completed.
Wardroom skylight: Nine-tenths completed.
Hatch coaming, mahogany: Nine-tenths completed.
Stateroom berths and drawers: Nine-tenths completed.
Side ladders and gratings: Nine-tenths completed.
Companion-way ladders: Nine-tenths completed.
Captain's berth and drawers: Nine-tenths completed.
Wardroom pantry: Seven-tenths completed.
Wardroom cornices: Eight-tenths completed.
Spiral stairs: Nine-tenths completed.
Wardroom and cabin bulkheads: Nine-tenths completed.
Wardroom blinds: Nine-tenths completed.
Poop-cabin blinds: Nine-tenths completed.
Poop and forecastle ladders: Nine-tenths completed.
Stateroom bulkheads: Nine-tenths completed.
Cabin pantry: Seven-tenths completed.
Skylight coamings for hatches, trunks, etc.: Seven-tenths completed.

Eleven-twentieths of the work has been completed. Will be ready for contractors' trial in about six months and final delivery to the Government in seven months.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. *Navy,*
Chief of Bureau of Construction and Repair,
Navy Department, Washington D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,
Bath Iron Works, Me., October 1, 1891.

SIR: In compliance with the Bureau's letter, No. 10884, dated September 25, 1891, relative to a supplementary report of work on gunboat No. 6 since July 1 and to October 1, 1891, I respectfully submit the following:
Flat keels, outer and inner: Completed.
Vertical keel: Completed.
Flat keelson: Completed.
Vertical keel bars: Completed.
Frames below and above water-tight deck: Completed.
Floor-plates: Completed.
Reverse frames: Completed.
Longitudinals: Completed.
Boiler saddles: Completed.
Engine foundation: Completed.
Stem: Completed.
Water-tight deck: Completed.
Water-tight deck beams: Completed.
Water-tight deck brackets: Completed.
Gun-deck beams: Completed.
Bulkheads: Seven-tenths completed.
Forecastle deck beams: Completed.
Magazines, fore and aft: Nine-tenths completed.
Platform beams: Nine-tenths completed.
Girders: Nine-tenths completed.
Poop-deck beams: Eight-tenths completed.
Gun-deck plating: Nine-tenths completed.

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Berth-deck beams: Completed.
Shell plating: Nine-tenths completed.
Stern post: Completed.
Stern framing: Completed.
Coal bunkers and other fore-and-aft bulkheads: Seven-tenths completed.
Port shutters: Four-tenths worked.
Water-tight doors: Five-tenths completed.
Watercourses: Completed.
Manger: Two-tenths erected.
Waterway: Nine-tenths worked.
Coal scuttles: Two-tenths worked.
Water tank: Nine-tenths worked.
Chain lockers: Eight-tenths completed.
Ash chutes: Five-tenths worked.
Engineer's workshop: Three-tenths completed.
Bilge keels: Five-tenths completed.
Sail room: Five-tenths worked.
Trimming tank forward: Completed.
Steering engine: Foundation nine-tenths completed.
Air ports and deck lights: Nine-tenths completed.
Water-tight door fittings: Nine-tenths completed.
Wire cable nippers: Nine-tenths completed.
Steering-gear forgings and castings: Five-tenths completed.
Gun-deck stringers: Eight-tenths completed.
Gun sponsons: Eight-tenths completed.
Stanchions: Completed.
Struts: Six-tenths completed.
Shaft bearings: Eight-tenths completed.
Hammock berthing: Two-tenths completed.
Portable coal chutes: Five-tenths worked.
Portable coal bunkers: Worked.
Hatch coamings: Five-tenths completed.
Mast partners: One-tenth erected.
Galley-house bed: Six-tenths completed.
Deck plank: Nine-tenths worked.
Coaling trunk: One-tenth completed.
Cofferdam and passages: Six-tenths worked.
Ordnance workshop: Three-tenths completed.
Firemen's washroom: Five-tenths worked.
General storeroom: Five-tenths worked.
Sluice valves, etc.: Three-tenths completed.
Rudder stock: Nine-tenths completed.
Rudder stuffing box: Nine-tenths completed.
Water-tight hatch fittings: Nine-tenths completed.
Water-tight sliding doors: Six-tenths completed.
Chain stoppers: Nine-tenths completed.
Spare tiller: Nine-tenths completed.
Brass bitts: Nine-tenths completed.
Coal-scuttle rings: Nine-tenths completed.

JOINER WORK.

Pilot house: Nine-tenths completed.
Poop-cabin cornices: Eight-tenths completed.
Overhead paneling: Nine-tenths completed.
Wardroom skylight: Nine-tenths completed.
Hatch coamings, mahogany: Nine-tenths completed.
Stateroom berths and drawers. Nine-tenths completed.
Side ladders and gratings: Nine-tenths completed.
Companionway ladders: Nine-tenths completed.
Captain's berth and drawers: Nine-tenths completed.
Wardroom pantry: Seven-tenths completed.
Wardroom cornices: Eight-tenths completed.
Spiral stairs: Nine-tenths completed.
Wardroom and poop-cabin bulkheads: Nine-tenths completed.
Wardroom blinds: Nine-tenths completed.
Poop-cabin blinds: Nine-tenths completed.
Poop and forecastle ladders: Nine-tenths completed.
Stateroom bulkheads: Nine-tenths completed.

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Cabin pantry: Seven-tenths completed.
Skylight coamings for hatches, trunks, etc.: Seven-tenths completed.
Eleventh-twentieths of the work has been completed. Will be ready for contractor's trial in about six months and final delivery to the Government in seven months.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON,
Chief of Bureau of Construction and Repairs,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY.
BATH IRON WORKS,
Bath, Me., October 1, 1891.

SIR: In compliance with the Bureau's letter No. 10884 dated September 25, 1891, I respectfully submit the following as the condition of work on harbor-defense ram No. 1 to date:

Outer and inner flat keels: Nine-tenths completed.
Vertical keel: Nine-tenths completed.
Frames: Eight-tenths erected.
Floor plates: Eight-tenths erected.
Reverse frames: Eight-tenths erected.
Longitudinals: First plates, seven-tenths erected; first angles, seven-tenths erected; second plates, six-tenths erected; second angles, six-tenths erected; third plates, seven-tenths erected; third angles, seven-tenths erected.

One-twentieth of the contract is completed, and it is estimated by the contractors that the remainder will be completed in nine months.

In the opinion of the contractors the harbor-defense ram No. 1 will be ready for the trial and final delivery to the Government in about ten months.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. N., Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR,
Elizabethport, N. J., October 1, 1891.

SIR: In obedience to the Bureau's order, dated September 25, 1891, No. 10884, I have the honor to submit the following supplementary report of work done since July 1, 1891, on the steel practice vessel, together with a statement of the total percentage of work completed and the probable time the vessel will be completed:

Rudder: Finished.
Shaft tubes and struts: Castings being fitted to framework of hull.
Transverse frames: Finished.
Engines, boilers, and shaft bearers: Engine bearers, eight-tenths, finished; boiler bearers, six-tenths, finished.
Longitudinals: Finished.
Rider plates: Finished.
Outside plating: Strake A, finished; strake B, nine-tenths finished; strake C, eight-tenths finished; strake D, eight-tenths finished; strake E, nine-tenths finished; strake F, nine-tenths finished; strake G, finished; strake H, finished; strake J, finished; strake K, five-tenths finished.
Hammock berthing and bulwarks: Bulwark five-tenths finished, and bounding angles of hammock berthing finished.
Forecastle and poop-deck beams: Finished, subject to change.
Main-deck beams: Finished.
Berth-deck beams: Seven-tenths finished.
Half beams and ledges: Nine-tenths finished.
Forecastle and poop deck stringers and tie plates: Nine-tenths finished.

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Main-deck stringers, tie plates, and plating: Six-tenths finished.
Berth-deck stringers, tie plates, and plating: Six-tenths finished.
Water-tight deck plating: Finished.
Water-tight flats: Finished.
Stanchions: Nine-tenths finished.
Transverse water-tight bulkheads: Nine-tenths finished.
Coal bunker and other fore and aft bulkheads: Nine-tenths finished.
Coaling ports: Holes cut in outside plating.
Coal chutes and trunks: Three-tenths finished.
Shaft alleys: Nine-tenths finished.
Water-tight doors: Frames for eight doors finished.
Sluice valves, pipes, etc.: Sluice valves finished.
Chain lockers: Finished except wood work.
Cofferdams: Nine-tenths finished.
Freeing ports: One port cut.
Sponsons: Four-tenths finished.
Plank-sheers or waterways: Plank-sheers on main deck abaft frame No. 79, finished; waterway on forecastle deck nearly finished.
Magazines: Finished except flooring.
Fixed-ammunition room: Finished except flooring.
Sail room: Finished except woodwork.
Galley inclosure: Bounding angles in position.
Windlass bed: Five-tenths finished.
Air ports: All ports cut.
Water tanks: Ready to be tested.
Trimming tanks: Finished.
Painting: Commenced painting inner skin in hold.

I estimate that 64 per cent of the hull work is completed to date.

The steel practice vessel should be ready for trial June 1, 1892, and ready for final delivery by July 15, 1892.

Very respectfully, your obedient servant,

LLOYD BANKSON,
Assistant Naval Constructor U. S. Navy, Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. N.,
Chief of Bureau of Construction and Repair,
Navy Department, Washington, D. C.

APPENDIX M.

REPORTS RELATIVE TO NECESSARY IMPROVEMENTS OF NAVY-YARD PLANTS.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Portsmouth, N. H., July 29, 1891.

SIR: In compliance with Bureau's order, No. 7110, of June 26, 1891, to report such suggestions for the improvement, alteration, or any addition to the construction plant at this yard, that will enable work to be performed more economically, I submit the following, to wit:

SHIPWRIGHT'S DEPARTMENT.

That the northern end of building No. 48, a part of which is now used for the futtock sawmill, be floored over, and that the sixteen doors coming within this space have windows instead to admit more light, at a cost of $400, labor and material, and the following pieces of machinery be placed therein: One double-armed planer, to be built at this yard, as we have all the necessary patterns on hand; one band resawing machine; one hand planer and joiner, and one improved pattern-maker's lathe.

JOINER'S DEPARTMENT.

I would recommend the removal of the block shop and grindstone room from the basement of the joiner shop. The cutting of doors at each end of the building, of sufficient size to admit of the passage of loaded teams; to change the position of the double surface planer on this floor—which now sits at right angles to the main

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shaft—to a position parallel with the shaft, thus increasing its efficiency. The only use now made of said planer is to plane deck plank and thick bulkhead stuff, it being so remote from other tools, and also in such close quarters, whereas, could it be so situated as to be used for all other planing, much time could be saved, as it would do at one operation what now requires a double passage through a single surface planer. I would also recommend that the main saw bench and such other tools as there would be room for be placed upon this floor, and the space now occupied by such tools be utilized by workbenches. By such an arrangement it will be possible to remove the cabinet shop from the ill-adapted attic floor to the third story of the building, and the whole upper floor of the building be occupied as a varnish and much-needed storeroom. This room could be made at a comparatively small expense by adding another story to the boiler house connected with the joiner shop. The roof of the boiler house could be raised intact and the walls increased in height not more than 8 feet, nor would the danger from fire be materially increased, as the floor would be about the same distance from the boilers as is the roof at present. An entrance to the room could be made from corner window of the shop. I would also recommend a water-closet and urinal on the second floor. As the yard is now being piped for water, a small outlay would bring the water into the shop and the cost of drainage pipe would not be great. To require the workmen to walk from the upper stories of the building to the wharf and return requires a walk of about a fifth of a mile, so that on the score of economy it would seem advisable to make the improvement. There is in the joiner shop an old-style wood-frame tenoning machine, altogether obsolete in these days when iron frames and improved methods of setting the knives and guages are in use in all progressive shops. I would recommend the sale of the above-mentioned tenoning machine and the purchase of a more modern and effective one in its stead.

SHIP-FITTER'S DEPARTMENT.

I would recommend that the following tools be required to facilitate with economy the work of building and repairing iron and steel vessels.

One plate straightening rolls.

Two radial drills.

One compound wound dynamo which, when driven at its rated speed, will develop 90 amperes and 220 volts, the speed not to exceed 900 revolutions per minute; to be entirely automatic in regulation so that rapid change of the load of 75 per cent without hand readjustment of the rheostat or brushes; will not cause undue sparking at the brushes or overheating of dynamo; to be furnished with automatic brush holders, which are fixed permanently to the frame of the dynamo and feed the brushes automatically against the commutator without changing their position from the neutral line on same; to have an efficiency of at least 90 per cent and the field and armature to have an insulation resistance of not less than 1,000,000 ohms; to be furnished with self-oiling bearings, and supplied with rheostat and suitable base frame, with belt tightener, complete in all respects; to be placed on foundation built by the Government from contractor's drawings; the dynamo to be driven from shop engine; a counter shaft and pulleys (one of which is to be a friction pulley) and line shaft pulley for line shaft making 130 revolutions, to be furnished; the Government to erect counter shaft and line pulley and furnish all belting.

Four portable electric motors, each motor guaranteed to develop 2 horse power on armature shaft with a difference of potential of 220 volts at the terminals when the shaft is run at normal speed. Motor to have an efficiency with full load at normal speed of not less than 70 per cent. The motor to be supplied with suitable gearing and spindle for attaching universal joint (for flexible or telescope shaft) which will run at 250 revolutions per minute at normal speed of motor, and to be supplied with a switch and rheostat, by which it can be started gradually and run at 250 and 500 revolutions, and eight different speeds between these as may be required. The speed when thus regulated must not vary more than 10 per cent from full load to an external load, and the motor must be capable of developing not less than 1½ horse power at any intermediate speed.

The gearing to be a rawhide pinion engaging into a bronze gear. All bearings to be made with graphite bushings. Motor to be furnished with automatic brush holders which are fixed permanently to the frame of the motor, and feed the brushes automatically against the commutators without changing their positions from the neutral line on same. The motor and gearing to be inclosed in a casing of approved material arranged to permit the oiling of all moving parts. A suspension eye to be placed over center of gravity of motor and case. To be supplied with 100 feet of flexible wire connection on suitable drum, which latter is to be provided with crank for reeling up. The weight of motor, gearing, case, switch, and rheostat complete not to exceed 250 pounds. The whole to be constructed for working in damp places, and to have an insulation resistance of at least 1,000,000 ohms. The following cir-

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cuits to be established in complete working order and connected to switchboard: One circuit of about 1,400 feet of No. 3 B. and S. gauge Grimshaw completion line wire carried along nearest side of dock basin. One circuit of about 1,200 feet No. 4 B. and S. gauge Grimshaw completion line wire carried along one side of ship house No. 5. One circuit of about 2,000 feet of No. 3 B. and S. gauge Grimshaw completion line wire carried along one side of ship house No. 4 and wharf. One circuit of about 800 feet of No. 5 B. and S. gauge Grimshaw completion line wire carried along the middle of the two construction shops. Circuits to be carried on poles where not attached to buildings or staging; poles to be 30 feet above ground, trimmed and painted, and supplied with cross arms, deep grooved insulators, and locust pins. The Government to plant all poles and furnish all unskilled labor in the erection of the above circuits, the contractor to furnish all expert labor and all materials necessary for completion of same. All material and workmanship to be of the best quality. Fifty 50-ampere combined connecting and cut-out boxes, each box to be arranged for attaching four flexible connecting mains to motor, lamp stands, or lamps, located at such points as shall be deemed necessary for the proper distribution of the current. Drawings showing location of dynamo and circuit will be furnished on application to the commandant of the yard. One slate base switchboard to be placed near dynamo, with one volt meter of 250 volts capacity, giving continuous indications of E. M. F. 1, with a pilot lamp to be used for the same purpose, and one ammeter of 200 amperes capacity, of such type as to be practically unaffected by a change of place of large masses of iron in immediate proximity to the meters; to have necessary switches of capacity sufficient to carry the maximum dynamo load into any of the circuits mentioned below, together with all the necessary cut-outs ampere strips, lightning arresters, etc., complete. Fifteen hand lamp holders with Edison key sockets, wire guards, and hooks for hanging up, each to have 100 feet of flexible wire connection with attaching strips. Estimated total cost, including erecting, about $4,000.

Ten differential direct pulley blocks.

One set expansion reamers, five-eighths to three-sixteenths inch, from 0. to 10.

Twenty-four taps for machine screws.

One grinder, with three emery wheels, for fluted reamers, and cutter, with countershaft and pulleys and main-shaft pulley.

Two pickling tanks.

Twelve portable forges.

One plate rack and derrick, with hoisting winch and boom.

Small tools, such as anvil blocks, riveting hammers, assorted chisels, clamps, dogs, hand trucks, and four forges for bending and welding of beams and angles; one overhead trolly for proposed new tool and wrench shed; and further recommended that the proposed building for heavy tools, as mentioned in my letter of July 11, No. 331, be extended eastward 150 feet in length by 75 feet in width and 14 feet high for the fitting of the frames and bulkheads in the construction of iron and steel ships.

BOAT-BUILDER'S DEPARTMENT.

To facilitate the work in this department I would recommend one improved double-belted planer, with patent compound yielding gear and steel lip cylinder, to plane 26 inches wide and 7 inches thick.

BLOCK-MAKER'S DEPARTMENT.

I would recommend the removal of this department to the new ship-fitter's building, as suggested in my report under head of "joiner's department," and that the following additional tools be required:

One band saw.

One hand buzz.

Planer, 20-inch, and one pony planer.

COOPER'S DEPARTMENT.

I would also recommend that this department be supplied with one double punch and shears, and one bottom lathe to expedite the work economically and promptly.

Following is an estimated cost of the proposed new tools and cost of erecting same:

Shipwright's department:

1 double-armed planer	$300.00
1 combination (band) scroll and resawing machine	530.00
1 hand planer and joiner	200.00
1 improved pattern makers lathe	170.00
Joiner's department, 1 tenoning machine	177.50

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Ship-fitter's department:	
1 plate straightening rolls	$2,250.00
2 radial drills	1,300.00
1 compound dynamo	3,735.00
10 differential direct pulley blocks	250.00
1 set expansion reamers	100.00
24 taps for machine screws	20.00
1 grinder	270.00
2 pickling tanks	1,200.00
12 portable rivet forges	175.00
1 plate rack and hoisting winch for boom	3,600.00
Small tools as enumerated	4,000.00
1 overhead trolley	1,500.00
Boat-builder's department, one improved double belted planer	175.00
Block-maker's department:	
1 band saw	95.00
1 buzz planer, 20-inch	200.00
1 19-inch pony planer	175.00
Cooper's department:	
1 double punch and shears	40.00
1 double-bottom lathe	150.00
Total estimated cost of proposed new tools	21,012.00
Total estimated cost of erecting same	8,000.00
Grand total	29,012.50

Estimated cost of proposed changes in buildings.

Shipwright's department, building No. 48	400.00
Joiner's department:	
Raising roof of boiler house, (plan A and A1)	950.00
Water closets and urinals	500.00
Flooring basement, new stairways, cutting doors, etc	700.00
Ship-fitter's department, proposed extension, as shown on plan C	6,000.00
Total	8,550.00

Grand summary.

Estimated cost of new tools and erecting	29,012.50
Estimated cost of proposed changes in buildings	8,550.00
Estimated total	37,562.50

I herewith submit plans showing the buildings as they are now, also plans showing in red the proposed changes.

Very respectfully,

JOHN B. HOOVER,
Naval Constructor, U. S. Navy.

NAVY-YARD, BOSTON, MASS.,
August 8, 1891.

SIR: In answer to Bureau's letter No. 7110, dated June 26, 1891, requesting report embodying any suggestions relative to the improvement, alteration, or addition to the construction plant at this yard that will enable work to be performed more economically and more promptly, respectfully submit the following report and recommend the following:

1 dynamo for electric drilling and lighting on ships under repairs, with necessary wiring, setting up, and connecting, estimated cost	$3,800
10 electric drill moters to develop 2 horse-power complete, with flexible shafts, presses, and drills, with 100 feet of wire each, estimated cost, $500 each	5,000
100 sixteen candle-power Edison lamps, with connections and wire, estimated cost	85
50 thirty-two candle-power Edison lamps, with connections and wire, estimated cost	80

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20 hand lamps, complete, wire-covered, with cut out plugs and wire, estimated cost	$325
1 double-headed engine lathe, 19 feet long between centers, and to swing 30 inches, estimated cost	4,000
3 engine lathes, 21-inch swing and 8-foot bed, estimated cost	2,525
1 cupola for foundry, erected and ready for use, estimated cost	2,000
1 universal carving, molding, and dovetailing machine, with cutters and all attachments, estimated cost	600
1 tonguing, grooving, and molding machine, complete, estimated cost	450
1 iron power beam-saw, estimated cost	600
2 iron cranes, complete, estimated cost	900
6 pulley-block travellers and trolleys, with capacity of 2 tons each, estimated cost	880
1 set of straightening rolls to straighten plates 7 feet wide	3,000
Total	24,245

Very respectfully,

W. L. MINTONYE,
Naval Constructor, U. S. Navy.

Capt. WM. WHITEHEAD, U. S. N.,
Commanding.

COMMANDANT'S OFFICE,
Navy-Yard, Boston, August 10, 1891.

Forwarded.

WM. WHITEHEAD,
Captain, Commanding.

OFFICE OF THE NAVAL CONSTRUCTOR,
Navy-Yard, New York, September 9, 1891.

SIR: In compliance with order from Bureau of Construction and Repair of 26th of June, 1891, No. 7110, directing that a report be forwarded relative to improvement, alterations, or additions to the construction plant of this yard, I have to submit the following list of tools required for immediate use, viz:

FOR SHIP YARD.

One double-cylinder friction-drum portable hoisting engine, to lift 3,000 pounds with single rope, complete, with dock wheels, foot brakes, vertical boiler, and all fixtures, including safety valve, steam gauge, water gauge, gauge cocks, throttle valve, stop valve, check and blow-off valves, lubricator, oil cups, drainage cocks, three-way exhaust cock (for creating a forced draft by exhausting into stack if desired) smokestack with adjustable cover, cast-iron smoke hood, grates, grate ring, fire-tight ash pan, fire tools, and 10 feet of suction hose; inspirator for feed water; stop valve in the delivery pipe between the pump and the boiler to open automatically. Boiler to be of the best quality and workmanship, guaranteed a working pressure of 100 pounds per square inch and to a test pressure of 160 pounds. Engines to be connected at an angle of 90°. The crank wheel to be counterbalanced to prevent vibration. All bearing to be fitted with the best antifriction metal and to be sufficiently large to prevent heating and wearing. Estimated cost, $1,1100.

Five push cars, standard gauge; weight about 600 pounds; wheels 16 inches diameter; floor built crosswise; axles 2 inches diameter, running in Babbet metal. Estimated cost, each, $35; total (5 cars), $175.

One 5-ton locomotive crane, to conform to specifications in all respects. The crane to run on tracks of standard gauge 4 feet 8½ inches; the radius to be about 18 feet; the truck of crane to be of solid construction, and to have attached to it boxes for the axle bearings and on the upper side of the truck bed, which is to be a heavy casting, to have a circular path for the superstructure. The rotating platform carrying the superstructure of the crane is to be mounted upon the heavy cast-iron truck bed; the rotating platform to be pivoted to the truck bed by hollow steel center pin, and to rest upon a circular turned path upon which shall travel cast-steel rollers taking the weight of the superstructure; the crane to have under its own steam the following motions: Longitudinal travel on track, rotation, hoisting, lowering. The lowering to be under control of steam or brake.

The engine to have a pair of cylinders 7 inches in diameter, and 7-inch stroke, to be coupled at right angles, and fitted with link reversing gear, and to be supplied

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with suitable oil cups and drip cocks. Boiler to be of steel, of vertical tubular type, of the best material and workmanship, and to be of ample capacity to supply sufficient steam when the crane is lifting maximum loads repeatedly; the boiler to be supplied with all usual mountings and fittings, the boiler to be so arranged as to be utilized for the counterbalance; and the crane to be provided with a tank for holding feed water; also to have coal box conveniently located on the platform.

The hoisting gear to have a drum sufficiently large to take the entire length of hoisting chain in a single wrap, and to be driven directly from the main engine shaft; and all gears in the hoisting mechanism to be of cast steel; a powerful brake to be conveniently operated by the foot to be furnished.

The rotation of the crane to be effected by friction clutches, which are to be so arranged that rotation in either direction may be effected without reversing the engines.

The truck frame to be fitted with rail clips, and to be extended so the crane can be locked in position to afford proper stability when handling maximum loads during any part of the circuit of rotation.

The top of the truck bed to have a turned bearing, and to carry on this bearing a slip ring having its upper face turned to form a path for the cast-steel rollers carrying the superstructure. This ring to drive by its resistance to sliding on its bearing, so that all danger of breakage to the teeth of the rotating gear and any undue strains to the structure in the event of sudden arrest of motion of the crane or the sudden starting or stopping of the engine shall be obviated.

The power of longitudinal travel to be taken from the main engine shaft by friction clutches, and to be transmitted through the hollow steel center pin in the truck bed by bevel gears to a horizontal shaft carried on the under side of the truck bed, and to transmit power to both pairs of truck wheels. All gears to be cast steel. The wearing surfaces to be large, and to have ample provision for lubrications.

All necessary fittings of every kind to be furnished with the crane. The crane to be tested under steam with maximum load, and through all motions, before leaving the contractor's works, and a certificate of such test to be forwarded when the crane is shipped. Estimated cost, $4,300.

One wharf crane, to lift 10 tons, at a radius of 16 feet. The crane to have a heavy cast-iron bed plate of suitable construction, to be secured to foundation on the wharf at the Brooklyn navy-yard; the upper side of the bed plate to have a circular turned path, upon which are to travel the cast-steel rollers bearing the weight of the superstructure.

The crane to have under its own steam the following motions: Rotation, hoisting, lowering, the lowering to be under the control of steam or brake.

The engine to have a pair of cylinders, to be coupled at right angles, and fitted with link reversing gear, and to be supplied with suitable oil cups and drip cocks.

Boiler to be of steel, of vertical tubular type, of the best material and workmanship, and to be of ample capacity to supply sufficient steam when the crane is lifting maximum loads repeatedly; the boiler to be supplied with all usual mountings and fittings, the boiler to be so arranged as to be utilized for the counterbalance, and the crane to be provided with a tank for holding feed water; also to have coal box conveniently located on the platform. The hoisting gear to have a drum sufficiently large to take the entire length of hoisting chain in a single wrap, and to be driven directly from the main engine shaft; and all gears in the hoisting mechinism to be of cast steel; a powerful brake, to be conveniently operated by the foot, to be furnished.

The rotation of the crane to be effected by friction clutches, which are to be so arranged that rotation in either direction may be effected without reversing the engines.

The top of bed to have a turned bearing, and to carry on this bearing a slip ring, having its upper face turned to ferm a path for the cast-steel rollers carrying the superstructure. This ring to drive by its resistance to sliding on its bearing, so that all danger of breakage to the teeth of the rotating gear, and any undue strains to the structure in the event of sudden arrest of motion of the crane, or the sudden starting or stopping of the engine, shall be obviated.

All necessary fittings of every kind to be furnished with the crane. The crane to be tested under steam with maximum load, and through all motions, before leaving the contractor's works, and a certificate of such test to be forwarded when the crane is shipped.

Variable radius gear to be furnished so that the boom may be raised or lowered by power when the maximum load is not on; and the variable radius gear to be so arranged that the boom may be raised or lowered by power with loads of not exceeding 2 tons on the hook. Estimated cost, $6,300.

Two double pump hydraulic jacks, to lift 100 tons through 12 inches. To be fitted with 2 pumps; the larger to give about one-third the pressure of the smaller and to work three times as fast. To be of the best workmanship and material throughout. Estimated cost, $400 each; total, $800.

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One hydraulic pulling jack, to pull 7 tons through a distance of 2 feet; total length to be about 42 inches. Estimated cost, $165.

One hydraulic pulling jack, to pull 15 tons through a distance of 2 feet; total length to be about 44 inches. Estimated cost, $275.

These jacks to have a force pump worked by a lever on the outside, and to work both vertically and horizontally. To be of the best workmanship and material throughout.

Four shunt-wound drill motors, similar in general design, material, and workmanship to the Edco motors now in use in the navy-yard, New York. Each motor to develop 2 H. P. by brake, with a difference of potential of 100 volts.

The weight of motor not to exceed 110 pounds. Each motor to be supplied with a switch, by which it can be started gradually, and so arranged as to allow the motors to be run for any number of revolutions of the shaft clutch between 250 and 500 per minute. The speed must not vary more than 10 per cent from full load to no external load, and each motor must be capable of developing not less than 1 H. P. at any of the intermediate speeds.

Each motor will be supplied with a Stow universal joint, with a light gun-metal guard, arranged to take a No. 6 Stow flexible shaft; also 100 feet of flexible wire, connecting on suitable drums. Gears to be of phosphor bronze, interchangeable, with bearings on both sides, and one set of spare gears to be furnished with each of the four motors.

The motors to be in casing of approved material, and to have suspension eyes fitted over center of gravity of motor and case.

All bearings to be self-oiling, and oil reservoirs so arranged as to be filled without removing any part of casing.

The motors to be designed and constructed with the special view of working in damp places, and must have an insulation resistance of at least 1,000,000 ohms.

One 25,000 Watt shunt-wound dynamo, to develop 200 amperes at 125 volts; number of revolutions not to exceed 1,300 per minute; to run continuously for twelve hours at full load without any sparking or undue heating; to have a commercial efficiency of at least 89 per cent; to be supplied complete with all necessary articles, including ampere meter, regulator, base frame, with belt-tightener arrangement, pressure indicator, counter shaft, and line-shaft split pulley. Estimated cost, $1,200.

PLATING SHOP.

One 10-inch pillar shaper mounted on hollow columns, with base about 36 by 28 inches; to be so arranged that the stroke may be graduated to any point in its extreme limit; the cutter slide to have a quick return and the cross feed to be automatic and adjustable. Length of stroke, 10 inches; traverse of table, 16 inches; distance between bottom of slide and top of table to be at least 11 inches.

The machine to be furnished with a planer vise turning on a circular graduated base, allowing the work to be set at any desired horizontal angle. One jaw to swivel, to allow either face to be turned to the work.

Line-shaft split pulley, countershaft, and all necessary wrenches and other fittings to be furnished with the machine. Total weight of machine, including countershaft and vise, to be about 1,900 pounds; to be of the best workmanship and material, and equal in all respects to the machines furnished by Pratt & Whitney. Estimated cost, $500.

One standard shaper, to plane 12 inches wide and 30 inches long. The stroke to be in the direction of the length of the table. The table to be adjustable, 14½ by 14½ inches, and an auxiliary table 11 inches long, to bolt on when longer table is required; the table to raise and lower by crank and screw with gibs through a distance of at least 12 inches. The tool slide to have a downward motion or feed by hand of 6 inches, and a cross feed of at least 12 inches by power, and to be placed in a swivel base; the return speed to be at least 2½ times as fast as cutting speed; the tool to cut always at the same speed whatever the length of stroke; to be so arranged as to allow altering the stroke while the machine is running. All bearings and loose pulleys to be self-oiling and bushed with bronze. The machine to be furnished complete in every respect, including countershaft, with self-oiling bearings, and a line-shaft split pulley.

One bolt-pointing machine, suitable for pointing or shaping the ends of bolts from one-fourth to 1 inch in diameter. The bolt to be held in a vise adjustable on the column of the machine and operated by a lever and a right and left hand screw; the head so arranged as to slide on the column is to be brought to the bolt by the action of a foot lever, the bolt to be steadied by a bushing while the cutter is at work. The machine to be furnished complete with all fittings, including line-shaft split pulley, countershaft, one cutter for rounding the bolts, one cutter for pointing wood-screw bolts, and a set of nine bushings, one of each of the following dimensions: ¼-inch, ⅜-inch, 7/16-inch, ½-inch, 9/16-inch, ⅝-inch, ¾-inch, ⅞-inch, and 1 inch.

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Weight complete, about 525 pounds. To be of the best workmanship and material throughout. Estimated cost, $150.

One Sellers tool-grinding machine, so arranged as to grind to shape from the rough forgings all ordinary tools used in lathes, planers and other machine tools, the cutting edges of which are bounded by planes, or planes and convex curved surfaces. The grinding wheel to be mounted on a box frame, part of which to serve as a tank for water to keep the tool cool; the grinding wheel to be reversible, to equalize the wear, and to be inclosed in heavy cast-iron cover. A rotary pump to force water on the tool, so arraged that the nozzle follows the tool in motion. Slide rests to be adjustable in angle by means of graduated arcs and verniers, and to have vertical, horizontal, and rotary motion.

The machine to be furnished with former plates for grinding ordinary tools, and also means to enable new former plates to be originated. It is also to be provided with—

(1) A chuck for circular or round-nose tools, which is also used in connection with former plates furnished to grind curved-faced roughing tools, right or left hand, and at any angle.

(2) A holder to be used in grinding the side or base of the shank of tool.

(3) A chuck by means of which any bent tool can be ground on all its faces without changing its position in the chuck, with as much ease as the grinding of straight tools.

(4) A chuck to hold splining or key-seating tools in the same manner.

(5) A crane for lifting the heavy wheel cover, changing the wheel on its spindle, or lifting the chucks, etc.

(6) Tables or diagrams supported on a convenient holder, upon which are figured fifty-six different kinds of plain-face tools, showing all the angles and the position of the chuck that holds them; nine different shapes of either right or left hand tools covering seven sizes of each, from one-half inch to 2 inches, indicating the former plate to be used in each case; a table of circular tools which the machine grinds perfectly, without the use of former plates, and embraces all sizes, from one-quarter inch to 2½ inches diameter of circles.

(7) Countershaft complete, and all necessary wrenches.

(8) Line-shaft split pulley.

Estimated cost, $1,525.

In accordance with Navy Regulation, Circular No. 83, I have to state this article and no other will answer the necessities of the service.

Two 24-inch 4-jaw lathe chucks; to be independent and reversible jaws; the screw to be made with long bearings at each end, and so fitted that in case the square end be broken or worn it can be reversed and the other end fitted to key; jaws and screws to be made of steel, and bearings to be accurately fitted; each chuck to be provided with one wrench, made of bar steel, and four bolts, for attaching to face plate. Estimated cost each, $65; total, $130.

Two 3-jaw 24-inch combination and universal lathe chucks; to have independent reversible jaws, so arranged as to be concentric or eccentric, as desired; the chucks to be made universal or independent at will, by meshing or unmeshing of a circular rack with bevel pinion on the screw. Estimated cost, $100 each; total, $200.

One 30-inch 4-jaw independent lathe chucks; to have a full nut; jaws to be reversible and extra heavy about pinion head; jaw, pinions, and screw to be of steel. Estimated cost, $120.

Twelve parallel swivel vises, with adjustable jaw. When in use the back jaw should adjust itself automatically to any angle, and hold firmly an object whether straight, beveled, or wedge-shaped. By the insertion of a pin the jaws should be fixed so as to form a solid jaw vise.

Four vises, to be 5½ inches, width of jaw. Estimated cost, $19 each; total, $76.

Six vises, to be 4½ inches, width of jaw. Estimated cost, $12.50 each; total, $75.

Two vises, to be 3½ inches, width of jaw. Estimated cost, $8.50 each; total, $17.

BLACKSMITH SHOP.

One Bement & Miles steam hammer; single standard with adjustable guides; weight of drop and attached parts, 350 pounds; to take steam above and below the piston; length of stroke, 18 inches, and upper die surface, 8½ by 6 inches; valve gear to take up its own lost motion, and to operate either automatically or by hand, producing any desired variation in the length, position. rapidity, and force of blow; to be so arranged as to allow the piston to be raised above the top of cylinder for insertion of rings, without operating the rod from the drop; to be provided with everything required, including treadle and an anvil made with separate cap, which can be easily renewed; all to be of the best material and workmanship. Estimated cost, $720.

One Bement & Miles 800-pound steam drop hammer; to allow stamping or forging without change of gear; stroke 30 inches and distance between guides of 15½ inches;

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to take steam above and below piston; valve gear to take up its own lost motion, and to operate automatically by hand and foot; adjustable guides to take up wear between drop and uprights; to be supplied with everything necessary, including anvil, but no dies; all to be of best material and workmanship. Estimated cost, $1,375.

One Bement & Miles 2,500-pound steam hammer with double standards and adjustable guides; to have a balance valve; the valve gear to take up its own lost motion by gravity, to work automatically or by hand, and to produce any desired blow; to be supplied with everything necessary, including anvil; all to be of the best material and workmanship. Estimated cost, $2,575.

In accordance with Navy Regulation Circular, No. 83, I hereby certify that these hammers and no others will answer the necessities of the service.

Two 16-inch weighted engine lathes with screw and back gear, to swing 16 inches over bed and 6¾ inches over carriage; the front bearing of line spindle to be 4½ inches long by 2½ inches diameter; to be driven by a four-step cone for a 2½-inch belt; largest diameter 10½ inches; the hole through the spindle to be three-quarters of an inch; screw thread on spindle for face place 2½ inches diameter, 6 threads to an inch. Set of gears to cut from 3 to 48 threads per inch; diameter of lead screw 1 3/16 inches; reduction of speed of spindle by gearing, 10¾; diameter of foot-block spindle, 1⅝ inches; size of slot in tool post, 1 3/16 by ⅝ inches; length of bed, 6 feet; to be supplied complete, with counter-shafts, wrenches, and line-shaft pulleys; also the following tools:

One 9-inch 3-jawed chuck; one No. 5 Skinner chuck, with taper shank; one No. 2 Woodbridge lathe tool, complete, with 12 extra cutters; one No. 2 new-thread tool with 6 V cutters, and one center tool; one side-boring tool; one No. 2 Johnson's cut-off tool and 12 extra cutters; one set common dogs, one each, ⅝, ½, ¾, 1, 1½, 1¾, 2, and 2½ inches; to be equal in all respects to the lathes manufactured by Pratt & Whitney. Estimated cost, $1,120.

One double-lever hand shears, for cutting bar and boiler iron; to be able to cut 5/16-inch boiler iron and ¾-inch square or round iron; to have 9½-inch adjustable cutters, which do not require packing when worn; to be furnished complete in all respects, including clamp for cutting bars lengthwise; to be equal in all respects to the shears manufactured by Jacob Brombacher's Sons. Estimated cost, $160.

One Saunders improved tapping and drilling machine, No. 3, with No. 4 crank chuck, to hold fittings from ¼ to 8 inches, for tapping and drilling steam and gas fittings, also for use as a drilling and boring machine; to be provided with cone pulleys and change gears to allow the change of speed necessary for the range of sizes in tapping or drilling; the spindles to be of steel, 2¾ inches in diameter; also to be counterbalanced and so fitted as to be conveniently raised or lowered; distance from center of spindle to column to be 18 inches; the frame to be at least 7 feet high, to allow ample length of belt between cone pulleys; to be furnished complete with all fittings, including line shaft pulley, counter-shaft, change wheels, wrenches, self-feeding attachment for drilling and boring, and two complete sets of the following machine taps and reamers: Solid taps and reamers ⅜, ½, ⅝, 1, 1½, 1¾, 2 inches; shell taps and reamers, diameter 2½, 3, 3½, 4, 4½, 5, 6, 7, and 8 inches. Estimated cost, $1,250.

In accordance with Navy Regulation Circular, No. 83, I have to state that this machine and no other will answer the necessities of the service.

One dozen cast steel rivet sets and leaders of each of the following numbers:

No. 00	$9.00	No. 5	$4.50
No. 0	9.00	No. 6	4.50
No. 1	7.50	No. 7	3.75
No. 2	7.50	No. 8	3.75
No. 3	6.00		
No. 4	6.00	Total	61.50

To repair present galvanizing plant (work to be done by navy-yard force), $1,500.

Drying kiln for timber (work to be done by navy-yard force), $2,500.

Present shipwright's shed at stone dry dock to be rebuilt for use as shipwright's tool room, work shop, and rigging loft. (The cost of this work should properly be borne by yards and docks.) Estimated cost, $3,000.

One pair of double beam scales, fitted with brass scoop, and platform 10 by 13½ inches; capacity to be from one-half ounce to 240 pounds; to be supplied with all necessary articles, including weights; to be equal in all respects to Fairbanks scales, No. 506. Estimated cost, $16.

One compound beam scales for crane, to have a capacity of 5,000 pounds; to be of the best material and workmanship and to be furnished complete in every respect. Estimated cost, $90.

One set of hand-pipe taps with right-hand thread, and to be of the best material and workmanship; to be of the following sizes: ¼, ⅜, ½, ¾, ⅞, 1, 1¼, 1½, 2, 2½, and 3 inches. Estimated cost, $20.

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Two steel coal barrows; capacity, 200 pounds; weight about 65 pounds; to be of best material and workmanship. Estimated cost, $14.50 each; total, $29.

One dozen extra heavy steel bowl melting ladles; diameter of bowl, 7 inches; to be tipped right handed. Estimated cost per dozen, $21.80.

The following tools, repairs, alterations, and additions to the plant are necessary to the efficiency of this department, but are not required for immediate use:

One steam hoisting engine, complete with boiler and fixtures (as per specifications in other list). Estimated cost, $1,100.

One hydraulic flanging press, to flange plates up to 3 inches in thickness; to take plates 18 feet long and in width 6½ feet. Estimated cost, $14,000.

A new boat shed.

New bending shed.

New angle furnace.

New plate racks fitted with overhead canes.

New shed at stone dry dock for light tools for ship fitting.

Plans and estimate will be furnished for the last items, if required.

All of the above tools and machinery to be delivered at such place in New York navy-yard as the commandant may direct.

Very respectfully,

F. L. FERNALD,
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD AND STATION,
New York.

COMMANDANT'S OFFICE,
Navy-yard, League Island, July 30, 1891.

GENTLEMEN: By direction of the Bureau of Construction and Repair you are hereby appointed a board to take into consideration the recommendation made in Naval Constructor Joseph Feaster's letter (copy inclosed) and will report in duplicate what you consider necessary to do to put these shops and tools in proper condition to carry on any work that might be wanted in the general repair of a vessel and her equipment, with the cost of labor and material for same.

Very respectfully,

W. A. KIRKLAND,
Captain, Commandant.

Naval Constructor JOHN F. HANSCOM, U. S. Navy.
Naval Constructor JOSEPH FEASTER, U. S. Navy.
Assistant Naval Constructor D. W. TAYLOR, U. S. Navy.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-yard, League Island, Pa., July 7, 1891.

SIR: In view of proceeding with the work as soon as practicable of putting the shops in condition for carrying on the work of repairing and fitting out vessels in the Construction Department at this yard, I respectfully ask permission to utilize about 160 feet of the south end of the mold loft building. The lower floor can be fitted up for boat work; the upper floor for joiner, cabinet, and block work. The old ship house formerly used for workshops is not provided with any tools or appliances whatever for carrying on the work, and, in fact, is settling in many places and will not last but a year or so longer.

The temporary frame structures used for smithery, paint shop, and sawmill, need a general overhauling and repairs, viz, the sill and some of the uprights in smithery building have rotted away in places, allowing the building to settle, a portion of the sill and several of the lower parts of the uprights require renewing; the blast-pipes and forges need a general overhauling also.

The paint shop and sawmill need a general overhauling and slight repairs before winter sets in.

Foundation for band saw appears to be settling and will have to be repaired and a portion renewed. I therefore respectfully ask permission to put the different shops in a safe and proper condition.

Very respectfully,

JOS. FEASTER,
Naval Constructor, U. S. Navy.

The COMMANDANT.

Respectfully forwarded to the Bureau of Construction and Repair for its information and action.

E. C. MERRIMAN,
Captain, Commanding.

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NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, League Island, Pennsylvania, August 9, 1891.

Sir: In compliance with the instructions contained in your letter of the 30th ultimo, a copy of which is hereto appended, we herewith submit plans and recommendations relating to the proposed improvements for carrying out any work that might be wanted in the general repairs of vessels and their equipment.

Plan No. 1. Proposed alterations and improvements in the new mold-loft building.

Plan No. 2. Alterations and improvements of the present wooden smithery building.

It is recommended to utilize about 170 feet of the upper floor in the south end of the new mold-loft building for joiner and cabinet work, the lower floor for boat and spar work, and to fit them up with tools and appliances for carrying on the work. The new engine and boiler required for the ship-fitting shop, which are now in the yard and not set up, can be utilized to a good advantage for running the machinery for joiner and boat work. There are on hand at the present time one molding machine and one medium-sized circular saw which can be made useful, and by using the new engine and boiler the work of building foundation, setting up tools, and running lines of shafting can be commenced at once; the old engine in the ship-fitting shop will last a while longer, and as there would necessarily have to be a new engine and boiler purchased to run the wood-working machinery, it is considered economical to utilize the engine and boiler on hand for that purpose.

In addition to these machines we would recommend the purchase of the following wood-working tools and shafting for this building, viz:

1 hand-feed planing and jointing machine	$175
1 mortising and boring machine	300
1 patent scroll-sawing machine	75
1 double cut-off saw	250
1 self-feed blind and slat tenoning machine	115
1 double panel-raising machine	175
1 blind stile mortising and boring machine	125
1 26-inch surface-planing machine	450
1 Bolt's carver and molding machine	350
1 No. 6 Fox patent universal trimmer	50
1 No. 3 44-inch patent bandsaw	320
1 No. 3 patent band resawing machine	600
1 double surface matching machine	385
1 automatic knife grinder	125
1 standard tenoning machine	239
1 set Armsbury bandsaw filing and setting machines	145
1 14-inch ripsaw complete for block-maker	110
1 26-inch surface planer for boat-builder	450
1 14-inch ripsaw complete for boat-builder	110
4 grindstones for joiner and boat-builder	175
Total wood-working tools for joiner, boat, block, and cabinetwork	4,724
Shafting, hangers, couplings, pulleys, etc.:	
350 feet of shafting, at 70 cents per foot	245
20 clamp couplings, at $6.50 per coupling	130
54 adjustable hangers, at $6 per hanger	324
40 pulleys (different sizes), average $15 each	600
1 Worthington steam pump	105
Total shafting, hangers, couplings, pulleys, and pump	$1,404

Foundations, house, etc.

	Material.	Labor.
Building foundation for engine and boiler	$425	$689
Building house for engine and boiler	550	650
Running line of shafting and setting up tools	350	875
Bulkhead in joiner and boat shop	200	475
Total for foundation, house, erecting shafting, etc.	1,525	2,689

Grand total for fitting up mold-loft building for joiner, boat, and cabinet work, $10,342.

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SMITHERY BUILDING.

This building is considerably out of repair, the sills are nearly all rotted away, and about one-third of the uprights are defective at their lower ends. Windows, doors, blast pipes, and blower need a general overhauling and repair. There are 6 double brick forges (old) located at the lower end of the building and 6 new single forges, partly finished, located along the sides of the building at the upper end. There are 3 old steam hammers placed along the sides of the shop, as shown on the plans.

To place the smithery in condition for carrying on work, it is recommended to renew the sills and scarf pieces on the lower ends of the defective uprights where needed, shift the old forges to the sides of the building to correspond with the new forges, and make room for the steam hammers in the center of the shop. The present location of the old hammers is not satisfactory on account of being cramped for room to handle the work, and two new steam hammers placed in the center of the building will overcome the difficulty. The machinery, steam pipes, and steam hammers need overhauling and repairs; also the brick floor in the boiler room.

There does not appear to be any fixed place for carrying on plumbing, tin, and coppersmith work. It is proposed to bulkhead off a space in the northwest corner adjoining the boiler room for that purpose, and provide a small shed on the outside to be fitted up for galvanizing purposes.

A coat of cheap paint on the outside of building and roof would preserve it, and whitewash on the inside would lighten it up considerably.

Estimated cost for repairs and tools.

	Material.	Labor.
For repairs to sills, uprights, windows, and doors	$420	$2,200
For shifting hammers and repairs to blast pipes	350	600
For removing old brick forges to sides of building	250	450
For foundations and erecting two new hammers	350	650
For repairs to machinery, old hammers, steam pipes, etc	275	725
Relaying brick floor in boiler room	50	175
Rebuilding partition and fitting up plumbing and copper shop	275	475
Rebuilding shed and fitting up galvanizing furnace	100	275
Painting outside and roof of building	300	225
Total for labor and material for repairs to smithery	2,870	5,775

Tools required.

1 1,100-pound steam hammer	$1,350
1 300-pound steam hammer	650
Total required for tools	2,000
Total required for material	2,370
Total required for labor	5,775
Total expenditure in smithery	10,145

SHIP FITTING SHOP.

The new tools and shafting already provided in this shop are being put in place; but to put the shop in efficient condition the floor, which is about one-half laid, will have to be finished and a few more tools provided.

Estimated cost for laying floor	$1,500
Estimated cost for material for laying floor	2,800
Total labor and material for floor	4,300
1 16 by 5 inch engine lathe, compound rest	450
1 25 by 8 inch patent openside planing and shaping machine	1,500
1 heavy universal milling machine	1,800
1 Universal tool-grinding machine	300
1 8-inch centrifugal grinding machine	50
1 heavy plate-straightening rolls	3,500
2 improved radial drill presses, $825 each	1,650
6 portable forges, $37 each	222
1 double portable hoisting engine	995
1 Corliss engine, 150 horse-power, and two cylindrical boilers	7,000
Total cost for fitting up ship fitting shop	21,767

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SAWMILL.

This building is in fair condition and only needs slight repairs to windows and doors; the roof and sides painted with common paints. The foundation for the large band-saw is about rotted away and unsafe when cutting heavy material.

	Material.	Labor.
Estimated cost to renew foundation	$450	$775
Estimated cost to paint building	375	200
Total expenditure in sawmill	820	975
	.....	820
Total amount of labor and material	.....	1,795

PAINT SHOP.

This building will need repairs to the floor, sides, windows, and doors; also new water drain around the roof; also a few shelves put up for material.

	Material.	Labor.
Estimated cost for repairs	$75	$225
	.....	75
Total amount amount of labor and material	.....	300

RECAPITULATION.

Joiner, boat, and cabinet work	$10,342
Smithery	10,145
Ship-fitting shop	21,767
Sawmill	1,795
Paint shop	300
Grand total	44,349

J. F. HANSCOM,
Naval Constructor, U. S. Navy, Senior Member.
J. FEASTER,
Naval Constructor, U. S. Navy.
D. W. TAYLOR,
Assistant Naval Constructor, U. S. Navy.

Capt. W. A. KIRKLAND,
Commandant Navy-Yard, League Island, Pennsylvania.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-Yard, Norfolk, Va., September 14, 1891.

SIR: In obedience to the order of the Bureau of Construction and Repair, No. 7110, of June 26, 1891, I have the honor to submit the following suggestions in regard to the improvement of the construction-machinery plant.

(1) A new and enlarged tool room is required at the ship-fitter's shed. It has not been possible to enlarge the tool room owing to the space occupied by the office of the master ship-fitter. The old pay-office building, No. 24, has now been assigned to this department, and will be used as an office for the master ship-fitter outside, and an assistant naval constructor.

(2) The boiler plant in the ship-fitter's shed, No. 60 now supplies steam for the engine in the ship-fitter's shop, No. 42, for the engine which runs the blowers for smithery and furnishes power for foundry and plummer's shop, and also for the 5 steam hammers in the smithery. The boiler now in the ship-fitter's shop is not used and occupies valuable space, and should be removed and sold. The boiler in the smithery is also useless, and should be removed and sold.

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(3) It is absolutely necessary under the present method of purchasing stores that the department should be supplied with a drying kiln for drying lumber to be used in joinerwork. There is a room in building No. 29, indicated on the plan of the yard, formerly a boiler room. It is proposed to fit a platform about 2 feet above the floor, and place sufficient steam-heater pipes beneath it to maintain a temperature of 160°, air to be forced in by a blower formerly used for ventilation on the *Brooklyn*. The chimney now standing will furnish the necessary draft.

(4) It would be an economy in handling material to have in this department a platform car for use on the yard railroad fitted with a steam crane.

(5) The timber basin has ceased to be of sufficient use to justify its maintenance, occupying such valuable space in the center of the yard. It should be converted into a fitting basin, in which ships could be brought near the shops. If the outer section of the basin were cleared of timber small boats could then be hauled up directly into the boat house, building No. 29, without having to hoist them by crane and transport them over land.

(6) The boat shop requires to complete its machinery outfit a new planing machine, a boat-frame bending apparatus, and an upright metal drilling machine.

(7) The smithery should be furnished with a bolt and rivet machine.

(8) The plumber's shop should be furnished with the following tools:

One cast-iron table 7 by 4 feet, 1¼ inches thick, finished.
One set of steel mandrels, 1-inch, 1¼-inch, 2-inch, 3-inch, 6-inch diameter, 8 feet long.
One small bending plate (cast iron).
One lead-burning machine.
Two steel pins for bending machine.
One new bench in lower shop.

(9) The ship-fitter's shop requires the following additional machine tools and small tools:

Grinding machine.
One large milling machine.
One 30-inch planer.
One 36-inch engine lathe, 18-foot bed.
Two 16-inch lathes, 12-foot bed.
One key seater.
Small tools, chucks, dogs, etc.

(10) The joinershop, which is now in process of being moved from building No. 29 to 30, will be, when equipped with the following additional tools, in a most efficient condition:

One twist machine, with necessary counter shafting, all bits for twist moldings; to be complete in every respect. Manufactured by P. Pyribil, 512 to 524 West Forty-first street, New York.
One of Fay & Co.'s No. 3 four-sided patent molding machines, the heads to have slotted face to admit of the use of any kind of cutters with irregular slots, this machine to be complete in every respect, and to have all appliances that are stated on page 71 in Fay & Co.'s catalogue, including extra head cutters for working sash, moldings, panels, blinds, doors; also match heads and cutters for working flooring, with all suitable countershafting, tight and loose pulleys.
One new iron frame pattern-makers' lathe, with movable carriage and tool post, double face plates, floor rest, etc., with all necessary countershafting, tight and loose pulleys, similar in every respect to the one purchased for the pattern-makers' shop, to be complete and ready for use. Manufactured by J. A. Fay & Co.
One set of cast-steel turning chisels, embracing 14 to a set, the width of chisels from ⅛ inch to 2 inches by eighths, to be of the very best quality; handle ready for use.
One set of cast steel turning gouges, embracing 14 to a set; width of gouges from ⅛ inch to 2 inches by eighths, to be of the very best quality; handle ready for use.
One bracket sand-paper machine, with all necessary countershafting, pulleys, and all appliances, as shown on page 228 in Fay's catalogue.
One small hand lathe for lock room, including countershafting, pulleys, and all necessary chucks, buffing wheels, polishing wheels, drills, etc., suitable for all kinds of small brasswork, such as drilling keys, etc.
One improved veneer press, made of steel and iron, 38 inches wide, with 3 screws adjustable across the frame. Manufactured by John Powsley, 228 and 230 Main street, Cincinnati, Ohio.
Four universal trimmers, latest improved 8-inch stroke, price $25 each. Manufactured by Grand Rapids Machine Co., John W. Oliver, proprietor, 101 to 140 North Front street, Grand Rapids, Mich.

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Six factory trucks No. 2, the movable standard, to be complete in every respect. Manufactured by John P. Powsley, 228 and 230 Main street, Cincinnati, Ohio.

One No. 7 lumber truck with self-dumping attachment, to be complete in every respect, manufactured by John P. Powsley, 228 and 230 Main street, Cincinnati, Ohio.

One Porter & Burnham's picture-frame vise.

Two of Parker's patent swivel vises, width of jaw 4½ inches, with anvil attachments, one of these vises to be used in the lock room, the other around machinery.

Sixty Farewell's rapid-transit wood-working screw vise. Manufactured by Adjustable Saw Table Co., Fitchburg, Mass.

Sixty bench hooks, No. 1, Frasse & Co.'s catalogue.

Sixty tail screws for wood-working benches. Manufactured by the Carpenter Tail Screw Co., Dayton, Ohio. The Linder patent.

Two band saws, 18 feet 2 inches long, three-sixteenths inch wide, Disston's best make, 24 gauge.

Two band saws, 18 feet 2 inches long, three-eighths inch wide, Disston's best make, 20 gauge.

Two band saws, 18 feet 2 inches long, one-quarter inch wide, Disston's best make, 22 gauge.

Two band saws, 18 feet 2 inches long, one-half inch wide, Disston's best make, 19 gauge.

One steam glue heater No. 8, weighing 275 pounds, inside of pot 4 feet 6 inches long, 10 inches wide at the top, 3 inches wide at the bottom, 5 inches deep, with brass safety valve attached to overflow pipe, brass bib cock in front for drawing hot water, the inside of the pot to be enameled, including legs, to be complete in every respect. Manufactured by John P. Powsley, Cincinnati, Ohio.

One steam glue-pot No. 3, with five enameled pots, one-quarter gallon each, and one enameled pot, No. 1, three-quarter-gallon, with iron legs, to be complete in every respect, ready for use. Manufactured by John P. Powsley, Cincinnati, Ohio.

One iron grindstone frame, suitable size for holding the following size stone: Diameter, 48 inches, thickness, 5½ inches, size of shaft at the bearing 1½ inches. We have this stone on hand, but it requires a frame to set it in, with all necessary countershafting and pulleys. Manufactured by Brown & Sharpe, Providence, R. I.

One improved grindstone truing device, 7-inch roller, price $13. Manufactured by Browne & Sharpe, Providence, R. I.

(11) A one-story shop, with a shed wing at each end, should be built between the dry docks. The shop should have a motive engine of 40-horse power, and should be fitted with a small outfit of machinery for doing ordinary repair work. At present the shops are so far away from the docks that much time is lost in making repairs. We have in the yard a set of 10-foot rolls and a large punch and shears not in use, which could be utilized for this shop.

The sheds would provide convenient storage for the gear used in docking, and furnish cover for stage plank, shores, horses, etc., which deteriorate rapidly when exposed to the weather.

Additional tools wanted for shop, for which steam could be obtained from the pump house:

One 40-horse-power motive engine.
Three lathes.
One bolt cutter.
One plate planer.
Two drills.
One pipe cutter.
One radial drill.
One 30-inch planer.
One tool grinder.
One punch and shearing machine.
One shaper.
Twist-drill grinder.
Fan.
Forges.
Small tools and fittings.
Shafting and piping.

Estimated cost of items suggested, including cost of installation.

1. New tool room and fittings	$750
2. Removing boilers	550
3. Drying room	1,500
4. Car crane	1,800
5. For cleaning outer basin	2,400

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Estimated cost of items suggested, including cost of installation—Continued.

6. Boatshed:		
Planer	$1,000	
Bender	750	
Drill	500	
		$2,250
7. Smithery:		
Bolt and rivet machine	1,500	
Heating forge	100	
		1,600
8. Plumber shop:		
Tools	1,000	
Remodeling shop	500	
		1,500
9. Shipfitter's shop:		
Grinding machine	1,500	
Milling machine	1,700	
30-inch planer	1,750	
36-inch lathe	1,500	
Two 16-inch lathes	1,000	
One key seater	350	
Small tools, machines, etc	500	
		8,300
10. Joiner shop:		
Electric lighting	900	
Blast piping	300	
Wood-working machinery	1,750	
Small tools and fittings	350	
		3,300
11. Drydock shop:		
40 H. P. engine	1,200	
Three lathes	1,500	
Two drills	600	
One bolt cutter	360	
One plate planer	3,400	
One pipe cutter	125	
One radial drill	1,400	
One 30-inch planer	1,750	
One tool grinder	250	
One punch and shearing machine	3,000	
One shaper	1,200	
Twist drill grinder	175	
Fan	100	
Forges	150	
Small tools and fittings	1,000	
Shafting and piping	2,000	
		18,210
Total		42,160

Very respectfully,

FRANCIS T. BOWLES,
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER, U. S. N.,
Commandant.

Approved and respectfully submitted to Chief of Bureau of Construction and Repair.

A. W. WEAVER,
Commodore, Commandant.

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NAVAL CONSTRUCTOR'S OFFICE,
Navy-yard, Norfolk, Va., September 19, 1891.

SIR: I have the honor to submit the following additional suggestions in regard to the improvement of the construction plant of this navy-yard.

Connect dynamo in ship-fitters shed with wooden dry dock, and supply six electric motors and six special portable drilling machines for use in drilling holes for armor bolts in ships placed in this dock to have armor fitted.

Wiring	$2,500
Motors	1,750
Portable drills	1,800
Total	6,050

Very respectfully,

FRANCIS T. BOWLES,
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER, U. S. Navy,
Commandant.

Approved and respectfully submitted to Chief of Bureau of Construction and Repair.

A. W. WEAVER,
Commodore, Commandant.

NAVAL CONSTRUCTOR'S OFFICE,
Navy-yard, Mare Island, Cal., September 8, 1891.

SIR: In obedience to the order of the Bureau of Construction and Repair, contained in its letter No. 7110, of June 26, 1891, I have the honor to submit the following report concerning the improvements of the construction plant of this yard, which will enable work to be performed more economically or promptly.

I have the honor to forward herewith plans showing the proposed arrangement of the construction plant in connection with the buildings and machinery already on hand, as follows:

No. 1006. Proposed general arrangement of construction shops. New buildings and alterations indicated by red ink.

No. 1007. Proposed arrangement of iron-working plant.

A.—IMMEDIATE IMPROVEMENTS.

Certain improvements should be undertaken at once, to permit the carrying on of work economically and promptly. These are in the order of their importance:

(1) The building of bending slabs and angle and plate furnaces in connection therewith.

(2) The completion of the new machine-shop and erection of machine tools therein

(3) The erection of a ship-fitters' shed, for punches, shears, plate-planers, etc.

(4) Purchase of new machine and power tools.

(5) Should a ship be ordered built in the yard, the slip on which the *Mohican* was built can be utilized, with some additional piling and other preparations, and a scrive-board and shed built at the location shown on the plan.

B.—ULTERIOR IMPROVEMENTS.

Many of the iron and wood working tools contained in the various buildings are antiquated and nearly worn out. The general dispositions of the wood-working and some other shops require rearrangement to suit modern methods, but are still fairly efficient at present for the amount of work apparent on hand. Additional tools should be bought to make a well rounded plant.

C.—IMPROVEMENTS COMING UNDER THE COGNIZANCE OF THE BUREAU OF YARDS AND DOCKS.

Among the improvements not built by the Bureau of Construction and Repair, but used by it more or less exclusively, are the following:

Should active operations in ship building be undertaken at the yard, additional slips will be required, and the old sectional dock-basin could be utilized for that purpose. This old basin is solidly piled at a depth of 12 feet below high water, and

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it is now filling up with mud. It could be dredged out and piers and blocking placed on the old piling, to make two excellent building slips. The yard is extremely deficient in buildings for the proper storage of lumber, a large proportion of it being now stowed in temporary sheds, where it is very inefficiently protected.

An additional dry dock is very desirable, as the sectional dock is useless in its present condition, and has a capacity only for small vessels.

A system of standard-gauge railway in connection with a ferry slip from which railroad cars could be sent directly into the yard and shops is very desirable.

Additional quay walls are desirable, to provide room for vessels repairing and fitting out, in the part of the yard south of the ferry slip, contiguous to the shops.

A.—Immediate Improvements, Plan No. 1007.

1. *Bending slabs and angle plate furnaces.*

These are imperatively necessary for building modern vessels. The proposed location is shown on the plan. They are placed between the two L's of the main construction building, in such a position as to avoid the expense of a large chimney; the one already built is of ample size for both the present boiler plant and the proposed furnaces. It will be necessary to remove the old gas holder, shown on the plan, which is not necessary, as the yard is lighted by electricity. It will be necessary to build a light shed over furnaces and slabs, to protect them from the weather. The proposed location will concentrate all the smith and furnace work in a central position. It is proposed to erect the hydraulic keel plate bender now on hand in the position shown in connection with the plate furnace. A certain amount of excavation will be necessary in connection with the establishment of slabs and furnaces.

Slabs, foundations for same, and hydraulic keel-plate benders	$12,000
Plate and angle furnaces	12,000
Shed to cover plate and angle furnaces	4,000

2. *New machine shop.*

The new machine shop indicated on the plan is now in course of completion. A gallery for light tools, etc., is under construction, and in connection with this it is proposed to fit a small traveling crane. A large Corliss compound engine of 250 horse-power has already been erected in the position shown on the plan. This engine provides ample power to drive all machinery in the construction plant, and it is proposed to utilize its power by wire rope transmission to run the saw-mill machinery in the building 42, and the wood working machinery in the building 40, indicated on plan No. 1006.

It is proposed to erect shafting and machine tools in the new machine shop, for making and repairing metal fittings for ships. A part of these tools are already on hand, but some of them are old and worn. They are at present located, temporarily, partly in the building marked "proposed offices," and partly in the main building, marked "proposed foundry."

To complete gallery in new machine shop, erect line shafting (already partly provided for), wire rope transmission, build foundations and erect tools, connect up with Corliss engine, etc., $8,500.

The new Corliss engine, although erected on its foundations, is covered only by a temporary shed, which is insufficient to protect it from the weather. A new wooden building for this engine is necessary, floors, gratings, etc., $4,000.

3. *Proposed ship-fitters' shed.*

A substantial open shed for ship-fitters' tools is imperatively necessary. The climate in this part of the country renders a closed building unnecessary.

A considerable portion of the tools already purchased for the yard are now stored for lack of suitable shops and sheds, and others absolutely necessary for the work on the *Monadnock* have been temporarily erected in the part of the building marked proposed foundry. It is proposed to erect a wooden shed with corrugated iron roof, closed only at the back against the prevailing winds. The building to be in three bays, each 50 by 150 feet, making a shed 150 feet square, which it is thought will be ample for present purposes. Should the shipbuilding plant be eventually enlarged, it will be easy to extend the bays in length, or add additional bays. It is proposed to furnish power for this shed from the Corliss engine by belting over from the shafting in the machine shop, as shown on the plans.

Erection of ship-fitters' shed complete	$28,000
Erection of line shafting, tools and foundation for same	12,000

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4. Machine and power tools.

To complete the iron-working plant to carry on the construction of, say, three modern vessels, a number of tools are required, as indicated in the following summary list. The following tools should be supplied at once:

For ship-fitters' shed:	
1 combined punch and shears for 1½-inch plate, 30-inch throat	$4,000
1 combined punch and shears for 1½-inch plate, 30-inch throat	3,300
3 combined punch and shears for ⅝-inch plate, 30-inch throat, at $3,000	9,000
2 plate planing machines for plates, 23 by 6 feet by 1 inch, at $5,600	11,200
1 plate planing machine for plates 18 feet long by 1 inch thick	3,000
1 cold saw cutting-off machine, capacity 48 by 6 inches	2,000
Set of tanks and cranes for pickling plates	2,500
4 jib crane countersinks, 8 feet radius, at $400	1,600
For machine shop:	
1 plating machine, 60 by 60 inches, 20 feet bed	5,000
1 planing machine, 24 by 24 inches, 10 feet bed	1,300
1 crank planing machine, 20 by 20 inches, 24-inch stroke	1,300
1 engine lathe, 60-inch swing, 20-foot bed	3,000
1 engine lathe, 30-inch swing, 18-foot bed	2,000
2 engine lathes, 24-inch swing, 12-foot bed, at $1,300	2,600
2 engine lathes, 16-inch swing, 8-foot bed, at $600	1,200
2 hand and drilling lathes, 12-inch swing, 6-foot bed, at $200	400
1 turret head chucking lathe	1,200
1 shaping machine, 16-inch stroke, two tables	1,800
1 slotting machine, 12-inch stroke	1,500
1 power milling machine, 12-inch table, 8½ inches from spindle to table	1,400
1 cutter grinder, Universal	350
1 horizontal coring machine to bore 61 inches	2,500
1 pipe-cutting machine for pipe 1 to 3 inches	100
1 pipe-cutting machine for pipe 2½ to 8 inches	800
1 metal band saw for sawing small brass work, etc	300
1 radial drill, 84-inch swing	2,400
1 radial drill, 60-inch swing	1,200
1 emery wheel tool grinder, 36-inch wheel	600
Miscellaneous chucks, drills, gauges, vises, and other small tools	7,000
	37,950
For wood-working shops:	
1 planing and matching machine for plank 24 by 6 inches	1,300
1 multiple gaining machine	600
1 horizontal mortising machine	500
1 shelf feed ripping-saw table	300
1 gap patternmaker's lathe, 25 by 50 inch swing	750
1 blind slat tenoning machine	200
1 blind wirer	50
1 carving machine	150
2 Universal trimmers, at $75	150
1 door and blind clamp, iron frame	300
1 sand-papering machine, 6 roll, double cylinder	650
1 molding machine, to mold four sides at once	800
	5,750
For shipsmith's shop:	
1 single standard steam hammer, 800 pounds falling weight	1,500
1 reverberatory heating furnace	4,000
Rearrangement of forges and rebuilding same, blocks and tools for angle and jobbing smith work	3,500
	9,000
Miscellaneous:	
1 portable hoisting engine and boiler	1,000
1 portable engine and boiler, 10 H. P	1,000
Miscellaneous shafting and hangers for shops	3,500
Miscellaneous cranes, overhead tram rail system	8,000
	13,500

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4. *Machine and power tools*—Continued.

The following tools to be supplied ulteriorly.

For ship-fitters' shed:	
2 portable hydraulic riveters with cranes to close 1 inch rivets, at $3,500. (30 inch gap)	$7,000
1 hydraulic frame setting machine	2,500
For machine shop:	
1 engine lathe, 84-inch swing, 30 foot bed	5,000
1 engine lathe, 30-inch swing, 18 foot bed	2,000
1 shaping machine, 12-inch stroke, 2 tables	1,300
2 goose neck drills, 1-inch capacity and 20-inch table at $300	600
1 portable drilling machine No. 4	350
Miscellanous small tools	3,000
1 emery wheel tool grinders, 36-inch wheel	600
Wood working machinery:	
1 band-saw mill	7,500
1 timber dressing machine, capacity 16 by 14 inches	2,000
1 smoothing planer, to plane 26 inches wide	550
1 tenoning machine	700
1 wood-turning lathe 24-inch swing	400
1 wood-turning lathe, 18-inch swing	350
1 column joiner and hand planer	250
	34,100
Miscellaneous:	
1 testing machine, capacity 100,000 pounds	$2,500
Electric motor plant for portable drills and lighting ships	10,000
1 steam hammer, single standard, 500 pounds, falling weight	1,000
1 portable boiler and wrecking pumps	1,500
	15,000

5. *Building slips and scrive board sheds.*

The preparation of a slip on the site of the *Mohican* slip would be very desirable, so that a ship if ordered could be commenced at once.

For piling, blocking, staying derricks, etc	$20,000
A scrive board shed of inexpensive character should be built with strong floor for boards, the location to be shown on the plan	4,000

B.—ULTERIOR IMPROVEMENTS.

A list of tools to be purchased ulteriorly has been given above for convenience, in connection with other tools.

2 additional slips and blocking to be built on the sites indicated. For the part of the construction coming under the cognizance of the Bureau of Construction and Repair	$40,000
To build a small foundry for iron and brass castings in the location shown on the plans, and equip with cupola, brass furnaces, etc	8,000
To refit tinners', coppersmiths', and plumbers' shops and build galvanizing plant	3,000
To rearrange wood-working plant in building 40	2,500
To rearrange sawmill	2,500
To put in two additional boilers, so that the boilers now in use can be reserved for pumping the dry dock	8,000

C.—IMPROVEMENTS NOT COMING UNDER THE COGNIZANCE OF THE CONSTRUCTION AND REPAIR.

No estimate has been made upon these. Some of them are of immediate importance.

Immediate improvements.

Objects.	Estimated cost.
1. Building slabs, angle and plate furnaces	$28,000
2. New machine shop	12,500
3. Erection of shed, foundation, tools, and shafting	40,000
4. Machine and power tools	102,800
5. Building slips and scrive board shed	24,000
Total immediate improvements	207,300

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Ulterior improvements.

Objects.	Estimated cost.
Machine and power tools	$49,100
Additional slips and blocking	40,000
Foundry and equipment, refitting tinners', plumbers', and coopers' shops and building galvanizing plant	11,000
Rearrangement of wood-working plant in building No. 40 and sawmill, building No. 42	5,000
Additional boilers	8,000
Total ulterior improvements	113,100

The above recommendations are made under the supposition that this navy-yard is to be thoroughly equipped as a building yard for modern vessels. As the only navy-yard possessed by the Government on this coast, it is of the utmost importance that it should be thoroughly equipped and that it should possess an efficient body of workmen attached to the yard. In the situation of the yard this can only be obtained by providing steady work for the mechanics, such as is involved in the construction of new vessels in various stages of completion. The best workmen can not be expected to remain where they can obtain only desultory employment, such as is afforded by occasional repair work.

Very respectfully,

J. H. LINNARD,
Naval Constructor, U. S. Navy.

Rear-Admiral JOHN IRWIN, U. S. N.,
Commandant Navy-Yard, Mare Island, Cal.

COMMANDANT'S OFFICE,
Navy-Yard, Mare Island, Cal., September 9, 1891.

Forwarded approved.

JOHN IRWIN,
Commandant.

APPENDIX N.

REPORT OF BOARD UPON THE METHOD OF FITTING ARMOR AND BACKING TO NAVAL VESSELS AND THE APPLIANCES REQUIRED IN THE EXECUTION OF THE WORK.

NAVY DEPARTMENT,
Washington, D. C., February 27, 1891.

SIR: I have the honor to transmit herewith, in obedience to your order of November 12, 1890, the report of the board appointed to consider and report upon the details of the best method of fitting armor and backing to naval vessels and the appliances which may be required in the execution of the work in the most efficient, economical, and expeditious manner.

The board wishes to call particular attention to the importance of adopting standard types and sizes of armor bolts. This will aid the manufacturer of the armor bolts by avoiding undue multiplicity in the taps and dies required to make the bolts, and also the Government, by reducing the number of special tools required at the navy-yards for fitting the bolts in place; it will therefore reduce both the time and cost of fitting the armor plates.

With the report, which is marked "A," are also transmitted full size drawings of the proposed armor bolts, marked Nos. 1, 2, 3, 4, 5, 6, 7, and 8.

Very respectfully,

PHILIP HICHBORN,
Naval Constructor, U. S. Navy, President of Board.

Hon. B. F. TRACY,
Secretary of the Navy, Navy Department.

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NAVY DEPARTMENT,
Washington, D. C., February 27, 1891.

SIR: In obedience to your order of November 12, 1890, directing us to consider and report upon the details of the best method of fitting armor and backing to naval vessels, and the appliances which may be required in the execution of the work in the most efficient, economical, and expeditious manner, we have carefully investigated the subject, availing ourselves of all the information obtainable as to the practice of foreign services, and have the honor to report as follows:

METHOD OF FITTING WOOD BACKING.

The inner surface of the backing, which fays against the plating behind armor, should be thoroughly coated with red lead or approved waterproofing composition when fitted.

The backing should be thoroughly calked with oakum where practicable and the seams payed with waterproofing composition.

Where it is not practicable to calk the backing approved waterproofing composition should be used.

Before applying the armor the outer surface of the backing should be well coated with red lead or other approved composition.

In preparing the wood backing it will be worked about one inch full, or more if the plates are greatly warped. The excess in thickness is to be carefully removed after the plate is received at the place where the ship is being built, and the backing made to fit the armor exactly by means of molds taken directly from the armor plates.

BACKING BOLTS.

Backing of eight inches and less in thickness to be secured by bolts seven-eighths of an inch in diameter. Backing of greater thickness to be secured by 1¼-inch bolts.

These bolts to be of galvanized iron or steel of the dimensions shown in the accompanying figures marked A.

Their heads to be sunk at least the diameter of the bolt below the finished surface of the backing, and covered by wooden plugs driven in red lead or waterproof composition.

Hempen grommets saturated with red lead to be placed under the washers of the nuts on the ends of these bolts. The joint between the two thicknesses of the double plating will be carefully calked.

There are to be two bolts on each side of every butt. The spacing of the remaining bolts of each piece of backing will depend somewhat upon the sizes of the pieces of backing and the spacing of the framing behind armor, but in general these bolts should be spaced not less than 3 feet nor more than 5 feet.

Where the backing is worked in two thicknesses the inner thickness need not have separate bolts.

METHOD OF FITTING ARMOR PLATES.

In fitting the armor plates the endeavor should be made to have the plates as nearly as possible metal to metal. To this end the templates of the plates should be made to fit closely to the armor shelf, the armor deck plates and the butts of the plates next to them.

An exception is to be made, however, in the case of templates for armor of ships that will be nearly completed before their armor is delivered; then, if it is probable that the plates of the armor deck and side plating above the armor belt will be in place before the armor is received, the templates of the plates will be made to fit closely at the butts, but with a clearance at the bottom of an eighth of an inch.

It is understood that the maximum variation that will be allowed in the dimensions of the plates will be (as called for by the circular of the Department dated August 21, 1886, on gun steel and armor)—

Variation allowed in length, less 0.2 inch, more 0.
Variation allowed in width, less 0.2 inch, more 0.
Variation allowed in thickness, less 0.08 inch, more 0.08 inch.
Variation allowed in the versed sine of curves, 0.08 inch, more or less, per yard of chord; but not in any case to exceed 0.2 inch.

The templates of the middle plates on each side of the ship will be retained at the yard where the ship is building until all other plates are in position, and then corrected as found necessary so that the last plate may fit as exactly as possible. The general order of putting on the plates should be to work from the forward and after ends of the side armor belt toward the middle plates and on both sides of the ship equally.

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The plates are to be fitted as closely to each other as possible, and their butts and edges calked with the usual calking tools whenever they are actually metal to metal.

Where the joints do not fit accurately at all points and the space in the joint does not exceed the maximum allowed variation, the back of the space is to be filled in with a cement of approved composition similar to that used in making "rust joints." At the outer surface metal "shim pieces" will be driven into the space left in the joint and calked on their outer edges flush with the face of the armor.

METHOD OF PREPARING DRAWINGS, TEMPLATES, AND MODELS FOR ORDERING ARMOR PLATES.

The following instructions are proposed with the view of establishing a uniform system of preparing templates and drawings for ordering armor plates. The order of work indicated is, however, simply intended as a general guide, and in any special case that the superintending naval constructor may consider it desirable to depart from it he should be at liberty to do so, but should report the fact with his reasons for so doing.

Order of work.

(1) Lay off on plating behind armor all holes for bolts of armor and backing, and edges of strakes of wooden backing. Fill up all holes that are already drilled and that are not needed for these fastenings, should there be any such. See that all calking is carefully done.

A general drawing will be made of the ship's side for the length of the armor belt, showing—

Position of armor bolt holes.
Position of backing bolt holes.
Butts and edges of pieces of wooden backing.
Butts and edges of armor plates.

This drawing to be to scale, but only general dimensions need be given.

(2) A drawing will be made, upon a scale of one-half inch to the foot, showing each armor plate separately, giving principal dimensions of all plates that are not duplicates of each other, the number of plates of each shape that is required, and giving schedule marks and calculated weight of the plates.

This drawing is to serve as a general guide to the manufacturer, and should be sent, together with the drawing already described, to the contractor for the armor as soon as possible.

(3) A detail drawing will then be made of each plate, on a scale of 1 inch to the foot, giving all its dimensions, the bevelings of butts and edges, position of armor bolts, their schedule marks, and angles with the inner face of armor.

The position of armor bolts will be given by the distances from the edges of the plates, of the point where the axis of the bolt pierces the inner surface of the plate; these distances to be measured on the actual curved inner surface of the plate.

The dimensions for this drawing will in general be obtained by taking measurements from molds erected in place on the ship.

(4) Where the plate has only a single curvature it will not in general be necessary to make a model of it, but templates will be made of the upper and lower edges of the plates and of the section at butts. The shape at the after butt of any plate being the same as that of the forward butt of the plate next abaft it, all such templates will be carefully marked and each will serve for the two plates.

The dimensions of all templets and models will be shown on the drawing of the plate, so that if warped or otherwise distorted in transportation, the dimensions may be checked.

In all cases where the templates and drawings described above may appear to be inadequate, especially when the armor plate has a considerably warped surface, a full size wooden model of the plate, and separate full size female model of its inner face, will be made and furnished to the manufacturer.

The wooden model of the plate will be strongly made of selected dry wood, of the general shape shown by the sketch, sheet K. It will not be boarded over, but will have its sides, which represent the edges and butts of the plate, worked to the proper bevels, and showing the rabbet in the upper edge of the plate, if there is one. Between the sides will be worked cross pieces, about 2 feet apart each way; they will be as nearly as possible perpendicular to the outer and inner faces of the plate, and their edges will be cut to the shape of these faces. The position of the axes of armor bolts will be marked on the cross pieces, or on pieces "let in" between two of them.

The full size female or "trying" model of the inner face of the plate will be built up in a similar manner to that described for the model of the plate itself. It may

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be considered to represent a model of the face of the wooden backing, and its object is to test the accuracy of the model of the plate and show at once whether that model has been warped or otherwise distorted in transportation.

When placed upon the inner face of the model of the plate (see sketch, sheet K), the two surfaces should coincide exactly, and the edges of this "trying" model should be in prolongation of the surfaces of the edges and butts of the model of the plate; these edges not to be less than 10 inches wide, so that this templet may be used in laying out and scribing the armor plate itself.

Before being shipped from the yard where they are made the two models should be placed as shown in the sketch, and their coincidence verified. When received at the steel works they should be verified in a similar manner; and also by such measurements as may be necessary to show that there has been no deformation during transportation.

(5) The final drawings and templets for the middle or closing plates on each side of the ship will be retained at the yard where the ship is being built until all other plates are in position, and then corrected as found necessary, so that the last plate may fit as exactly as possible.

The general order of putting on the plates will be to work from the forward and after ends of the side armor belts toward the middle plate, and on both sides of the ship equally.

(6) It is to be noted that the butts, and where possible, the upper and lower edges of the plates, should be plane surfaces, so as to be readily machined; the surfaces of the butts of the plates to be normal to the inner face of the armor at the middle of the depth.

(7) When all templets and drawings are made the backing will be put in place at such time and manner as may be prescribed; but care will be taken in fitting it to work it about 1 inch full, or more if the plate is considerably warped; the excess to be removed when the plate is received at the yard, and the backing made to fit the armor exactly, by means of molds and reverse molds taken directly from the armor plates. When models have been furnished to the contractor for armor they should be returned with the corresponding plate to the yard where the vessel is receiving her armor, as the work of fitting the wooden backing to the proper shape may be greatly facilitated by their use.

ARMOR FASTENINGS.

In considering the types of bolts to be used in securing the armor plates to the ship it is thought a matter of first importance to adopt certain standard types, suitable for the usual conditions that exist on board armored vessels, and in each individual case to depart as little as possible from these standards, and particularly to retain always the same type and pitch of screw threads.

Special taps and dies are required for cutting the screw thread on the bolts and in the armor plates; special tools are needed for drilling the double plating of the ship's side, and standard gauges and templets will have to be prepared for inspectors at place of manufacture to insure accuracy and proper fitting of machine work of bolts and plates.

The adoption of the standard types as proposed will, it is thought, reduce the cost and time of preparing and fitting the armor fastenings for any one ship to a minimum.

The dimension used to designate the size of the armor bolt is the diameter of its reduced body or shank. The following sizes are proposed (dimensions in inches and decimals): 1.5, 2, 2.4, 2.8, 3.2, 3.6.

The thickness of armor appropriate for each size of bolt is:

3.6-inch bolt for plates from 18 to 21 inches thick.
3.2-inch bolt for plates from 15 to 18 inches thick.
2.8-inch bolt for plates from 12 to 15 inches thick.
2.4-inch bolt for plates from 9 to 12 inches thick.
2-inch bolt for plates from 6 to 9 inches thick.
1.5-inch bolt for plates from 3 to 6 inches thick.

SPACING OF ARMOR BOLTS.

The number of armor bolts for each plate will be proportioned to the area of the outer surface of the plate.

Armor 3 to 6 inches thick, one bolt for each 3.5 square feet of surface.
Armor 6 to 12 inches thick, one bolt for each 4 square feet of surface.
Armor 12 to 21 inches thick, one bolt for each 4.5 square feet of surface.

These rules are based on a ratio of total sectional area of shanks of bolts to weight of plate, varying between 5.5 and 7 square inches per ton of plate. Wherever it may be necessary to depart slightly from the rules given above, the number of

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square inches of total sectional area of shanks of bolts will be kept, wherever possible, more than 5.5 and less than 7 times the weight of the plate in tons.

The bolts will be distributed over the surface of the plate as regularly as the framing behind armor will allow, so that if we consider the surface of the plate divided into sections of equal area there will be a bolt in the center of each of them.

The center of an armor bolt hole should never be less than 3½ times its own diameter from the edge of the plate.

The shape of the armor plates and the arrangement of the framing behind armor will cause slight variations in the number and distribution of the armor bolts; but the above general instructions should be adhered to as closely as the circumstances in each case will permit.

ARMOR WITH WOOD BACKING.

Side armor bolts.

For the side-armor belt and such other places where there is sufficient space inside the double-skin plating to allow it to be done the type of bolt that is thought to be most suitable is that shown in sheet B.

The object of reducing the diameter of the body of the bolt so as to form a "shank" is to distribute the work done upon the bolt over as great a length as practicable, and so increase the amount of energy that the bolt is capable of absorbing without breaking. As, however, an increased length of bolt adds to the weight of the armor fastenings there is a limit beyond which it is not desirable to go. A comparison of English and French practice would indicate a length of shank equal to three times its own diameter as being desirable, and we recommend that it be adopted wherever practicable.

With the thickness of wooden backing now generally used behind side armor, it is sometimes impossible to have bolts of this length of the type shown in sheet B, and it is necessary to modify the bolt so that it may both have the desired length of shank and be firmly held at the point it passes through the double plating behind armor, and care must be taken here, as in the previous case, to make the joint water tight at the point where the bolt passes through the plating. These requirements have been considered in the bolt shown on sheet C; the length of the steel sleeve to be such that the total length of the two shanks of the bolt may be three times its own diameter; the lengths of shanks to be measured between the edges of the reënforces.

Where the armor is reduced in thickness at its lower edge, the increased thickness of backing will sometimes allow a sufficient length of bolt to be obtained without the use of the steel sleeve. The general arrangement of the armor bolts will then be that shown on sheet E.

TURRET ARMOR BOLTS.

Bolts for armor for turrets and other places where the projection inward from the double plating must be reduced to a minimum, and where it is not necessary to make water-tight work at the passage of the bolt through the double plating, to be of the type shown on sheet D. With this bolt the armor is drawn securely in place by the thread in the plate itself, not by a nut on the inner end of bolt as in sheets B and C, and to do so, the nipple on the end of the side armor bolts is omitted here, so that any slight play may be allowed for by letting the bolt go a little farther into the clearance recess below the thread,

Tables are appended giving all dimensions of the bolts shown on sheets B, C, and D.

THREAD OF ARMOR BOLTS.

The threads of all armor bolts will have a profile of the type used for breech plugs of modern ordnance, the steep side of thread so placed that it may be that upon which the bolt bears when in tension. The profile of the threads of the armor and nut ends of the side armor bolts will therefore have the direction of the sides of thread reversed, but otherwise they will be the same.

Profile of thread for 3.2 and 3.6 inch bolts.

These bolts will have 3 threads per inch; the thread to have an inclusive angle of 60 degrees and its steep side to make an angle of 15° with the perpendicular to the axis of the bolt; the radius of circle at top and bottom of the thread to be 0.04 inch.

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Profile of thread for 2.4 and 2.8 inch bolts.

These bolts will have 3½ threads per inch; the thread to have an inclusive angle of 60 degrees, and its steep side to make an angle of 15° with the perpendicular to the axis of the bolt; the radius of circle at top and bottom of thread to be 0.035 of an inch.

Profile of thread for 1.5 and 2 inch bolts.

These bolts will have four threads per inch.
The thread to have an inclusive angle of 60°, and its steep side to make an angle of 15° with the perpendicular to the axis of the bolt.
The radius of circle at top and bottom of thread to be 0.03 of an inch.

DIRECTION OF ARMOR BOLTS AS REGARDS INNER FACE OF ARMOR.

The double plating behind armor should be as nearly as possible parallel to the inner face of the armor plate, or such part of the plate as has a constant thickness, so that the armor bolts may be perpendicular to both the inner face of armor and the double plating. In the case of ships that are already built or under construction, in which the double plating makes an angle with the inner face of the armor, the bolts should be placed with their axes perpendicular to the double plating, so that the hexagonal cups and the cast-steel sleeves may be square to the surface of the plating.
Before the armor plate is tapped it is to be counterbored at bolt hole as shown on sheet "B," so that the full length of the threaded portion of the bolt may always be in the plate, no matter what the angle is between the inner face of armor and the double plating.
Proper allowance must be made for the counterboring in scheduling the lengths of the armor bolts.

ARMOR WITHOUT WOOD BACKING.

When the armor plates are fitted without wood backing, as in the case of deck armor or thin side armor, a special type of bolt will be required.
For armor from 3 to 6 inches thick a 1.5-inch bolt should be used, of the shape shown on sheet "F." The thread of this bolt will be the Whitworth standard—1½ inches outside diameter, 4½ threads per inch. There will be one bolt for each 3.5 square feet of surface of plate.
The joint between the double plating behind armor will always be carefully calked before the bolts are put in place.
Armor less than 3 inches thick will be riveted to the plating behind armor with through rivets.

HANDLING ARMOR PLATES.

The appliances that are most suitable for handling the armor plates when received in the navy-yards and putting them in position on board ship will be influenced to a certain extent by the local conditions at each yard and by the cranes and floating derricks now available.
On the delivery of a plate at the yard it must be taken from the car or barge in which it arrives and placed on skids with the inner face uppermost, so that the necessary templates for fitting the wood backing may be made and the bolt holes examined and fitted with studs for "guide bolts," as described under the head of "appliances for fitting armor bolts" (p. 23). If the plates are to be put on in dry dock they will naturally be placed as near the dock as convenient; if the ship is to receive her armor afloat the armor must be taken to the water front in such a position that the floating derrick can reach it. In either case a traveling rotating crane of at least 40 tons' capacity will be necessary to perform the work expeditiously. The board understands that the Bureau of Yards and Docks is to construct such cranes at both Norfolk and New York.

Putting on armor afloat.

Whenever possible, the armor should be put on afloat so as not to occupy the dry-docks. All turret armor and such side armor as the design and state of construction of the vessel permits, should be put on afloat, and may be slung by eyebolts tapped into the upper edge of the armor plate, these top holes to be filled after the armor is secured in place by a plug. When rivets are to be tapped into the upper edge of the armor plate, the position of the holes for the eyebolts will be taken if possible, so that one of the rivets will tap into each plug that fills a hole for these eyebolts, and so reduce the number of holes that are tapped into the armor itself.

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The armor plate being brought to the water front by the 40-ton traveling crane referred to above, it is taken by a floating derrick to the ship and brought to place by levers and athwartship tackles and secured by means of bolts through the pilot holes in backing and inner plating, as described on page 24.

In order to put on the armor expeditiously afloat, the constant service of a floating derrick will be required, and it is strongly recommended that at each navy-yard where armored ships are to be built that a floating derrick of 50 tons' capacity be provided for this purpose, so that the work may proceed without interruption.

Putting on armor in dock.

When the weights on board the vessel that is to receive her armor bring the armor shelf below the water line, or when for other reasons it is deemed expedient to place the vessel in dry dock to receive her side armor, the following method of work is suggested. The vessel being docked and securely shored, a working platform about 30 feet long to be built abreast the position where the first plate is to be placed. This platform to have a carriage arranged to receive the armor plate and bring it to its position on the armor shelf.

The track of the 40-ton rotary traveling crane will be run as closely as possible to the side of the dock, so that the crane may lower the armor plates upon the carriage that is on the platform in the dock at the level of the armor shelf. The crane therefore serves to take the armor plates from the car or float on which they arrive in the yard and place them in a convenient position near the dock so that the templates for fitting the backing can be made; then when the ship is ready to receive the plate it transports the plate to a point abreast the position on the ship where it is to be placed and lowers it upon the carriage. During the whole of the time the armor is under complete control of the crane, and the time and cost of handling is reduced to a minimum.

The carriage that brings the plate to its place on the armor shelf to be provided with hydraulic jacks for raising it to the exact height of the armor shelf and pushing it home against the backing. The plate is then secured temporarily by bolts through the "pilot holes" in the side of ship.

Appliances for fitting armor bolts.

In order to have water-tightness at the joint where the armor bolt passes through the double plating of the ship's side, it is necessary to have the hole bored through the plating exactly concentric with the bolt itself, so that the hard rubber ring that makes the joint may be equally compressed on all sides. It is not possible to bore the holes with this accuracy before the plate is in place, and the following method is suggested for boring the holes after the armor is in position.

The bolt holes of a plate that is about to be put in place are fitted with screw plugs, having the same thread as the armor bolts, and tapped out to receive internally the threaded end of a "guide rod." The inner thread to be exactly concentric with the outer, so that the direction of axis of guide rod may coincide with that of armor bolt. A flexible template of strips of sheet iron is made of the inner face of the armor plate and the position of centers of bolt holes transferred to the backing A "pilot hole" is then bored through the backing and double plating, making the same angle with the face of the backing as will be made by the armor bolt. To obtain this angle accurately, a "guide rod" is screwed into the plug in the bolt hole in the armor, and the angle the bolt makes with the face of the plate measured by sliding a tripod (see sheet "G") over the guide bolt, and setting up the three screws in the feet, till they bear equally on the face of the plate. Take the supplements of the angles thus obtained, set the screws in the feet of tripod accordingly, and apply it to the face of wood backing, and use it as a guide for the shank of auger that bores the pilot hole. When the auger has bored nearly through the wood backing it will be replaced by a Morse twist drill of the same diameter that will carry the hole through the double plating. The pilot hole that is thus formed should be about half an inch more in diameter than the guide bolt, so that in spite of the small errors made in the transfer of the position and direction of the armor bolts, it may always be possible for the guide bolt to adjust itself in the pilot hole.

The armor plate is then placed in its position on the armor shelf and four bolts of the same diameter as the guide bolts are screwed in at the corner bolt holes and set up with nuts to hold the plate temporarily while the armor bolts are being fitted.

"Guide bolts" are screwed from inboard into the holes in the screw plugs in the armor bolt holes, the axis of a guide bolt being thus coincident with that of the armor bolt which is to replace it. A cutter head, bored to fit the guide bolt closely and centered by it, is used to cut through the double plating, and so insure the clearance about the armor bolt being perfectly uniform.

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A sketch of the general arrangement is shown on sheet "H." The cutter head is carried by a tube fitting over the guide bolt, and having at its upper end a shank to fit a stow-drill press driven by a flexible shaft and an electric motor. As the space in which this work has to be done is very limited so that only a few men can work at a time, and as the time of fitting the bolts will probably be longer than any of the other parts of the work, it is thought to be a matter of the first importance to provide an ample number of motors so that this work may proceed with the greatest rapidity.

After cutting through the double plating a second cutter head, so arranged as to cut the wood backing, will be used in the same manner as the first, and will be also driven by an electric motor. (See sketch of cutter heads, sheet "I.")

When the whole has been carried through to the inner face of the armor, a spanner will be slipped down the guide bolt, and the screw plug and guide bolt unscrewed together and removed, and the joint between the two thicknesses of the double plating will be carefully calked. The armor bolt will then be screwed in place; the rubber rings, tube, washer, cup, and nut fitted as shown on sheets "B," "C," and "D," and finally the nut set up until the rubber washer in cup is compressed to one-half its original height.

Very respectfully,

PHILIP HICHBORN,
Naval Constructor, U. S. Navy, President of Board.
PHILIP R. ALGER,
Professor of Mathematics, U. S. Navy, Member.
J. H. LINNARD,
Assistant Naval Constructor, U. S. Navy, Member.
J. J. WOODWARD,
Assistant Naval Constructor, U. S. Navy, Member.
D. W. TAYLOR,
Assistant Naval Constructor, U. S. Navy, Member.

Hon. B. F. TRACY,
Secretary of the Navy, Navy Department.

TABLE I.—*Dimensions of side armor bolts.*

[Type without sleeve, sheet B.]

Sizes of armor bolts.	Reference letter.	Relation between dimensions.	1.5 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
			Sq. in.	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Sq. in.*	*Sq. in.*
Area of section of shank of bolt	.....	$\frac{\pi \cdot a^2}{4}$	1.767	3.142	4.524	6.158	8.042	10.179
Area of section at bottom of thread in armor	.....	$\frac{\pi \cdot f^2}{4}$	2.545	4.524	6.514	8.867	11.581	14.657
Bolt and nut.								
Armor end:								
Diameter of shank of bolt	*a*	.....	*Inches.* 1.5	*Inches.* 2.0	*Inches.* 2.4	*Inches.* 2.8	*Inches.* 3.2	*Inches.* 3.6
Diameter of reënforce	*b*	$a+2s$	1.78	2.28	2.72	3.12	3.58	3.98
Length of reënforce	*c*	$\frac{a}{2}$	.75	1.0	1.2	1.4	1.6	1.8
Radius of fillet joining reënforce to shank	*d*	$3a$	4.5	6.0	7.2	8.4	9.6	10.8
Pitch of thread	*e*	.....	4 threads per inch		3½ threads per inch		3 threads per inch.	
Diameter of bottom of thread	*f*	$1.2 \times a$	*Inches.* 1.8	*Inches.* 2.4	*Inches.* 2.88	*Inches.* 3.36	*Inches.* 3.84	*Inches.* 4.32
Depth of thread	*g*	.....	.14	.14	.16	.16	.188	.188
Length of threaded part of bolt	*h*	.....	1.15	1.48	1.74	2.02	2.30	2.57
Length of thread in the armor plate	*i*	$\frac{1}{2}a$	1.0	1.33	1.60	1.87	2.13	2.40
Depth of clearance recess in plate	*j*	.....	.3	.3	.32	.40	.40	.40
Total depth of hole in armor plate	*k*	$j+f$	1.3	1.63	1.92	2.27	2.53	2.80
Height of nipple on end of bolt	*l*	.....	.15	.15	.18	.25	.22	.28
Diameter of nipple on end of bolt	*m*	$\frac{a}{2}$	.75	1.00	1.2	1.4	1.6	1.8

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TABLE I.—*Dimensions of side armor bolts*—Continued.

Sizes of armor bolts.	Reference letter.	Relation between dimensions.	1.5 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
			Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Nut end:								
Diameter of reënforce	n	$a+2s$	1.78	2.28	2.72	3.12	3.58	3.98
Length of reënforce	o	$\frac{P+c_1+m_1}{2}+0''.1$	P+.85	P+.91	P+1.04	P+1.10	P+1.23	P+1.29
Radius of fillet joining reënforce to shank	p	.....	0.5	.5	.6	.6	.6	.6
Total thickness of double plating behind armor*	P	.....						
Pitch of thread	q	s	4 threads per inch		3½ threads per inch		3 threads per inch.	
			Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Diameter at bottom of thread	r	a	1.5	2.0	2.4	2.8	3.2	3.6
Depth of thread	s	.....	.14	.14	.16	.16	.188	.188
Length of thread	t	$a-0''.2$	1.30	1.80	2.2	2.6	3.0	3.4
Length of throat between thread and reënforce	u	.....	.28	.28	.32	.32	.38	.38
Diameter of circle circumscribed about hexagonal head	v	$\frac{4}{5}a$	1.20	1.60	1.92	2.24	2.56	2.88
Height of hexagonal head	w	.....	.78	.86	.94	1.02	1.10	1.18
Diameter of circle circumscribed about nut	y	$2.2\times a$	3.3	4.4	5.28	6.16	7.04	7.92
Height of nut	z	$0.8\times a$	1.2	1.6	1.92	2.24	2.56	2.88
Hexagonal cup.								
Diameter of internally inscribed circle	a_1	$2.4\times a$	3.6	4.8	5.76	6.72	7.68	8.64
Total height of cup	b_1	c_1+d_1	1½	1⅞	1 15/16	1 11/16	1½	2.00
Thickness of metal	c_1	.....	⅜	⅜	⅜	⅜	⅜	⅜
Depth of interior cup	d_1	.....	½	1	1 9/16	1 5/16	1⅛	1 9/16
Diameter of center hole	e_1	$n+0''.02$	1.8	2.3	2.74	3.14	3.60	4.00
Radius of interior fillet joining bottom and sides	f_1	.....	3/16	7/32	¼	9/32	5/16	⅜
Radius of interior fillet joining vertical sides	g_1	.....	¼	5/16	5/16	⅜	⅜	7/16
Hexagonal plate.								
Diameter of inscribed circle	h_1	$a_1-0''.08$	3.52	4.72	5.68	6.64	7.60	8.56
Diameter of central hole	i_1	$n+0''.02$	1.8	2.3	2.74	3.14	3.60	4.00
Thickness of plate	j_1	$\frac{m_1}{2}$	⅜	7/16	½	9/16	⅝	11/16
Soft rubber washer.								
Outside diameter	k_1	.....	2.93	3.90	4.73	5.52	6.30	7.08
Diameter of central hole	l_1	$n+0.''02$	1.8	2.3	2.74	3.14	3.60	4.
Thickness (uncompressed)	m_1	.....	¾	⅞	1	1⅛	1¼	1⅜
Thickness when compressed	$\frac{1}{2}m_1$	.....	⅜	7/16	½	9/16	⅝	11/16
Diameter of recess	n_1	.....	2	2½	3	3½	4	4½
Height of recess	o_1	.....	5/16	⅜	⅜	⅜	⅜	⅜
Tube (wrought iron or mild steel).								
Interior diameter of tube	p_1	$n+0.''02$	1.8	2.3	2.74	3.14	3.60	4.00
Thickness	q_1	.....	7/32	¼	9/32	5/16	11/32	13/32
Outside diameter of tube	r_1	$p_1+2\,q_1$	2.238	2.8	3.30	3.77	4.29	4.81
Radius of interior fillet (end toward armor)	s_1	$\frac{1}{10}a$	.075	.1	.12	.14	.16	.18
Height of hard-rubber ring, when compressed (end toward armor)	t_1	.....	.375	0.5	0.6	0.7	0.8	0.9
Height of hard-rubber ring, when compressed (end toward nut)	u_1	.....	⅜	⅜	⅜	⅜	⅜	⅜
Diameter of holes to be drilled in the double plating and backing	v_1	$r_1+0.''02$	2.258	2.82	3.32	3.79	4.31	4.83
Total projection of the nut end of bolt beyond the double plating	x_1	.....	3.21	3.85	4.50	5.04	5.71	6.25

* To be taken from plans.

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TABLE II.—*Dimensions of side armor bolts.*

[Type with sleeve, sheet C.]

Sizes of armor bolts.	Reference letter.	Relation between dimensions.	1.5 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
			Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Outside diameter of end of sleeve against cup	a_4	.....	3.23	4.36	5.22	6.02	6.88	7.68
Outside diameter of end of sleeve against double plating	b_4	.....	4.2	5.1	6.02	6.92	7.88	8.78
Outside diameter of body of sleeve	c_4	.....	2.86	3.64	4.28	4.90	5.58	6.22
Inner diameter of body of sleeve	d_4	$n+0''.4$	2.18	2.68	3.12	3.52	3.96	4.38
Inner diameter of end of sleeve against cup	e_4	$n+0.''1$	1.88	2.38	2.82	3.22	3.68	4.08
Inner diameter of end of sleeve against double plating	f_4	$n+0''.8$	1.98	2.58	3.02	3.42	3.88	4.28
Thickness of body of sleeve (the area of section of sleeve is 1½ times that of armor bolt)	g_4	.....	.34	.48	.58	.69	.80	.92
Length of machined surface of sleeve at end against cup	h_4	.....	⅝	⅝	⅝	⅝	⅝	⅝
Length of machined surface of sleeve at end against double plating	i_4	.....	½	½	½	½	½	½
Height of ring of hard rubber at double plating	j_4	.....	⅜	⅜	⅜	⅜	⅜	⅜
Distance of inner face of hard-rubber ring from seam between plates of double plating	k_4	.....	¼	¼	¼	¼	¼	¼
Distance of outer face of hard-rubber ring from seam between plates of double plating	l_4	.....	⅛	⅛	⅛	⅛	⅛	⅛
Length of reënforce at double plating	m_4	$P+\frac{1}{2}''$	.....	.....	.....	.....	.....	.....
Length of reënforce at cup end	n_4	$o_1+\frac{m_1}{2}+0''.85$	1.48	1.54	1.79	1.85	1.96	2.04
Height of washer over hard-rubber ring	o_4	$P_1-\frac{1''}{4}$	.....	.....	.....	.....	.....	.....
Thickness of inner plate of double plating*	P_1	.....	.....	.....	.....	.....	.....	.....
Total thickness of double plating*	P	.....	.....	.....	.....	.....	.....	.....

* Taken from plans.
The other dimensions of these bolts are the same as for the type without steel sleeve.

TABLE III.—*Dimensions of turret armor bolts.*

[Sheet D.]

Sizes of armor bolts.	Ref. letter.	Relation between dimensions.	Similar dimension of side armor bolts.	1.5 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
Area of section of shank of bolt	.....	$\frac{\pi a_2^2}{4}$	.....	*Sq. in.* 1.767	*Sq. in.* 3.142	*Sq. in.* 4.524	*Sq. in.* 6.158	*Sq. in.* 8.042	*Sq. in.* 10.179
Area of section at bottom of thread in armor	.....	$\frac{\pi f_2^2}{4}$	.....	2.545	4.524	6.514	8.867	11.581	14.657
Bolt.									
Armor end:									
Diameter of shank of bolt	a_2	.....	a	*Inches.* 1.5	*Inches.* 2.0	*Inches.* 2.4	*Inches.* 2.8	*Inches.* 3.2	*Inches.* 3.6
Diameter of reinforce	b_2	f_2+2g_2	.....	2.08	2.68	3.20	3.68	4.22	4.79

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TABLE III.—*Dimensions of turret armor bolts*—Continued.

Sizes of armor bolts.	Ref. letter.	Relation between dimensions.	Similar dimension of side armor bolts.	1.8 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
				Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Length of reinforce	c_2	$\frac{a_2}{4}$	.....	0.375	0.5	0.6	0.7	0.8	0.9
Length of throat below thread	d_2	.....	u	0.28	0.28	0.32	0.32	0.38	0.38
Pitch of thread	e_2	.....	e	4 threads per inch.		3½ threads per inch.		3 threads per inch.	
				Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Diameter at bottom of thread	f_2	$1.2\times a_2$	f	1.8	2.4	2.88	3.36	3.84	4.32
Depth of thread	g_2	.....	g	0.14	0.14	0.16	0.16	0.188	0.188
Length of the threaded part of bolt	h_2	.....	.....	1.8	1.68	1.92	2.27	2.53	2.8
Length of thread in armor plate	i_2	$\frac{2}{3}\,a_2$	.....	1.0	1.33	1.6	1.87	2.13	2.4
Depth of clearance recess of tap	j_2	.....	j	0.30	0.30	0.32	0.40	0.40	0.40
Total depth of hole in the plate	k_2	i_2+j_2	h	1.8	1.68	1.92	2.27	2.53	2.8
Radius of fillets joining the shank with the reinforce:									
Small radius	l_2	.....	.....	0.23	0.27	0.31	0.35	0.39	.43
Large radius	m_2	$3a_2$	d	4.5	6.0	7.2	8.4	9.6	10.8
Nut end:									
Diameter of reinforce	n_2	b_2	.....	2.08	2.68	3.20	3.68	4.22	4.70
Length of reinforce	o_2	$P+c_2+\frac{m_2}{2}+j_2$	.....	P+1½	P+1½	P+1$\frac{7}{16}$	P+1$\frac{7}{16}$	P+1½	P+1½
Radius of fillet joining shank and reinforce	p_2	$\frac{n_2-a_2}{2}$	.....	0.29	0.34	0.40	0.44	0.51	0.55
Diameter circumscribed about bolt head	q_2	$2.2\times a_2$	y	3.3	4.4	5.28	6.16	7.04	7.92
Height of bolt head	r_2	.....	s	0.78	0.86	0.94	1.02	1.10	1.18
Radius of fillet joining bolt head and reinforce	s_2	.....	.....	0.08	0.12	0.16	0.20	0.24	0.28
Hexagonal cup.									
Diameter of internally inscribed circle	a_2	$b_2+0.''08$	a_1	3.6	4.8	5.76	6.72	7.68	8.64
Total height of cup	b_2	c_2+d_2	b_1	1½	1½	1$\frac{5}{8}$	1$\frac{11}{16}$	1¾	2
Thickness of metal	c_2	.....	c_1	⅜	⅜	$\frac{5}{16}$	$\frac{5}{16}$	⅜	⅜
Interior height of cup	d_2	.....	d_1	¾	1	1¼	1½	1⅝	1⅞
Diameter of central hole	e_2	$n_2+0.''02$	.....	2.1	2.7	3.22	3.70	4.24	4.72
Radius of interior fillet joining bottom and sides	f_2	.....	f_1	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	⅛
Radius of interior fillet joining vertical sides	g_2	.....	g_1	¼	$\frac{1}{16}$	$\frac{1}{16}$	⅛	⅛	$\frac{1}{16}$
Hexagonal plate.									
Inscribed diameter	h_2	.....	h_1	3.52	4.72	5.68	6.64	7.60	8.56
Diameter of central hole	i_2	$n_2+0.''02$	.....	2.1	2.7	3.22	3.70	4.24	4.72
Thickness	j_2	$\frac{m_2}{2}$	f_1	⅛	$\frac{1}{16}$	¼	$\frac{1}{16}$	⅛	$\frac{1}{16}$
Soft rubber washer.									
Outside diameter	k_2	.....	.....	3.0	3.96	4.82	5.61	6.40	7.28

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TABLE III.—*Dimensions of turret armor bolts*—Continued.

Sizes of armor bolts.	Ref. letter.	Relation between dimensions.	Similar dimension of side armor bolts.	1.5 inches.	2 inches.	2.4 inches.	2.8 inches.	3.2 inches.	3.6 inches.
				Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Diameter of central hole	l_2	$n_2+0.''02$	.....	2.1	2.7	3.22	3.70	4.24	4.72
Thickness	m_2	.....	m_1	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$
Diameter of hole drilled in double plating and wood backing	n_2	$n_2+0.''02$	.....	2.1	2.7	3.22	3.70	4.24	4.72
Total projection of bolt head beyond double plating	o_2	$r_2+o_2+m_2$	.....	1.91	2.11	2.38	2.58	2.85	3.06
Outside diameter of wrapping of marline	p_2	$n_2-0.''02$	.....	2.06	2.66	3.18	3.66	4.20	4.68
Thickness of double plating*	P	.....	.....	.....	.....	.....	.....	.....	.....

* Take this dimension from plans of turrets.

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REPORT

OF THE

CHIEF OF THE BUREAU OF STEAM ENGINEERING.

NAVY DEPARTMENT,
BUREAU OF STEAM ENGINEERING
Washington, October 12, 1891.

SIR: In obedience to your order of the 29th September, last, I have the honor to submit to the Department the annual report of this bureau, together with the estimates for the fiscal year ending 30th June, 1893.

APPROPRIATION, STEAM MACHINERY, 1891.

Amount appropriated for the fiscal year ending June 30, 1891, act approved June 30, 1890		$650,000.00
Expended to October 1, 1891—		
Labor in the navy-yards and stations in repair of steam machinery, boilers, etc., of naval vessels fitting for sea service, and preservation of tools, handling and preservation of materials, stores, etc	$396,442.33	
Purchase of materials, stores, machine tools, freight, and incidental expenses	180,599.57	
Payments for repairs, materials, freight, and incidental expenses on foreign stations	43,457.16	
Total	620,499.06	
Less repayments by transfers in the adjustment of appropriations	9,445.95	
Total expenditures		611,053.11
Balance on hand		38,946.89
Obligations of the bureau to be paid from this balance—		
Approved requisitions unfilled (estimated)	15,522.49	
Unfilled contracts, orders, and reservations	16,754.54	
Total obligations		32,277.03
Balance remaining to the credit of the appropriation		6,669.86

GENERAL OPERATIONS OF THE BUREAU.

During the last year the Bureau has prepared plans and specifications for the motive machinery of the following vessels: Protected cruiser No. 13; torpedo cruiser No. 1; torpedo boat No. 2; and for a new ferry launch at the Portsmouth navy-yard; it has also prepared many detail drawings for the machinery of the *Cincinnati* and *Raleigh*, and for auxiliary machinery.

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The apparatus for testing indicators and their springs has been completed and is in constant use in the New York navy-yard. This apparatus is believed to be the most perfect one of its kind in existence. Indicators are tested under steam pressure, and this pressure is measured directly by a column of mercury, to which all possible corrections are applied. The apparatus has been so perfected that it is only necessary to attach the instrument, regulate the steam pressure, and then push a button; the pencil is pressed against the paper and the drum revolved by electricity.

A series of tests was made of the evaporative efficiency of one of the Thorneycroft boilers of the *Cushing*; a full report of this will be found in Appendix A.

A series of experiments has been commenced to determine the efficiency of different methods of banding copper pipes with a view to prevent a rupture or tear from internal pressure from extending beyond a few inches. These experiments are being made with the pipe at the temperature due to the pressure of steam it is intended to convey, and are believed to be the first so made. It is regretted that these tests will not be completed in time to appear in this report. A portion of the apparatus employed, showing methods of obtaining temperature desired, is shown in Pls. 20 and 21.

A set of progressive trials, as complete as circumstances would permit, was made with the *Cushing*, and the report will be found in Appendix B. Till these trials the power of the machinery in this boat had never been determined.

WORK DONE ON THE MACHINERY OF NAVAL VESSELS.

The following is a brief statement showing the nature of the work done on the machinery of all vessels in commission, laid up for repairs, or in ordinary, during the fiscal year ending June 30, 1891, with a few particulars brought to later date. The cost of the work, together with that of stores and outfits, will be found in the succeeding tabular statement.

Adams.—The force at the Mare Island navy-yard worked upon a new crosshead and the preservation of machinery. The ship was placed out of commission July 31, 1891.

Ajax.—Besides preservation of machinery, overhauled main pistons and springs and made new dowel for shoe; overhauled safety valves and other parts of boilers; repaired steam-launch machinery and assisted on board the *Wyandotte* and *Canonicus*.

Alarm.—Preservation of machinery.

Alert.—Connected engines, overhauled water valves, and repaired throttle-valve; assisted in removing tubes from condenser, tested the latter and tried the machinery; overhauled boiler safety-valve gear; covered some steam pipes and cemented steam drums. Overhauled auxiliary pumps and ash-hoisting engine; overhauled and tested steam-launch machinery; removed coal for examination of the hull and assisted in work of strengthening hull in engineer department; repaired heaters and did some work for deck. The navy-yard force at Mare Island babbitted and fitted both crank-pin brasses; repaired steam pipe and bilge receiving pipe; cleaned condenser tubes, patched and calked boilers, felted and leaded them; repaired smoke pipe; repaired heater pipes and distillers; secured patches to defective places in skin of ship; renewed hull plates, rivets, webs of frames, etc., in department, and strengthened some of the engine and boiler fastenings. The vessel was commissioned October 9, 1890, and has been docked in December, 1890 and May, 1891.

Alliance.—Renewed piston springs, adjusted cylinder packing rings, remade joint, calked seam, and renewed patch in high-pressure steam chest; examined condenser tubes, trimmed air-pump valves; packed circulating pump piston, overhauled air and bilge pumps and bilge injection; scraped crank-pin brass; chipped and filed crosshead pin and brasses; drilled out broken fulcrum bolt and straightened lever of clutch coupling, and set up on holding-down bolts; calked seams in shells, furnaces, and tube sheets of boilers; expanded leaky tubes; ground safety valves and calked flange of valve chamber; renewed socket bolts; repaired air ducts and furnace doors; par-

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tially sealed all boilers and renewed zincs; examined outboards; overhauled auxiliary pump, ash hoist, and anchor engines; distiller, heater pipes, and steam cutter machinery; repaired leak in bunker; repaired engine and boiler of missionary steam launch at the Caroline Islands. Machine shop at Hong-Kong fitted patch on high-pressure cylinder; made new nut for low-pressure valve; repaired feed tank, and shop at Yokohama repaired escape pipe. Placed in commission January 16, 1890. Docked in September, 1891. Knots run, 10,817.

Amphitrite—The navy-yard force at Norfolk repaired cut-off valve and stem accidentally broken; took means for the preservation of machinery; removed smoke pipe and lower casing for work by the department of construction and repair; examined propeller and overhauled outboards. Docked in October, 1890.

Atlanta.—Set main valves; examined pistons; overhauled main stop valve; white metalled crank-pin brasses, overhauled condenser tubes; repaired cylinder of air and circulating pump engines; renewed valves in air, feed and bilge pumps; put up traveler bars for brasses and bonnets; packed stern stuffing box and tried holding-down bolts. Calked leaky seams in shells and furnaces of boilers; expanded leaky tubes; renewed some tubes and stay rods; renewed ferrules where needed; overhauled stop and safety valves and repaired gear of the latter; ground checks and blows; fitted circulating-plates; scaled all boilers and fitted zincs. Examined outboards; overhauled auxiliary pumps, lathe and ventilating engines, heaters, valves and pipes; overhauled ice machine; scaled evaporators and renewed coils; fitted racks for tools, hose and spares; worked upon platforms and ladders; scaled and painted bunkers and repaired sliding doors; repaired steam-launch machinery; overhauled anchor engine and pistons of capstan and steering engines; made repairs upon pumps, valves, drains, and manhole plates of compartments. The Norfolk navy-yard force put in good condition the piston rings, metallic packing of cylinder-jackets, water valves and gear, air and circulating pumps, auxiliary exhaust pipes, main and stern bearings, outboards and water service; patched and calked boilers, renewed furnace fronts and bridge walls, and ground boiler valves; renewed bilge, flushing, and platform pumps and piping; overhauled blower engines and air ducts; fitted new ash engine; overhauled steam capstan and steam-launch machinery; secured keelson-plates; cut limber holes and passages, and repaired cement in double bottoms. Contractors covered boilers and steam and exhaust pipes. Ship in continuous commission since July 19, 1886. In dock December, 1890, and May, 1891. Knots, 9,231 in three quarters.

Baltimore.—Aligned three pistons and overhauled rings and springs of all; repaired and ground engine stop valve; overhauled governors, water valves and their gear, repaired receiver pipes, also reversing engines; overhauled air and circulating pumps and their valves; repaired details of main and auxiliary feed and bilge pumps; dressed crank pins and brasses; aligned crossheads and fitted their brasses; overhauled main and line shaft brasses; tightened holding-down bolts and scraped propellers. Calked seams, rivets, braces and stays of boilers; expanded leaky tubes; overhauled all stop and safety valves; repaired check valve and hydrokineter valves; overhauled bottom and surface blows and sentinel valves; drove back bulges in one crown sheet to proper position and patched crack; overhauled damper gear; made manhole plate bolts; renewed zincs and scaled several boilers. Ground auxiliary steam valve; repaired fire, flushing, and auxiliary pumps; overhauled ash hoists, blower engines and air ducts; repaired distiller coils and heater pipes; repaired auxiliary injection pipe and bilge valve; renewed bolts in tachometers; repaired lathe tools, emery wheel shaft and vise; overhauled valve gear of water bottoms and cemented the latter; did several jobs for deck and one for the *Petrel*, and a strong working party was on board the *Itata* four days. The navy-yard force at New York repaired auxiliary injection pipe and helped on machinery in general to get it ready for sea in the time ordered; the dockyard at Kiel made several minor details and repairs, and machine shop at Toulon made zinc rings for propeller shaft and some minor articles. Commissioned January 7, 1890. Docked September, 1890, and February, 1891. Total knots, 20,481.

Bennington.—Brought stores on board and arranged fittings. The force at the New York navy-yard examined outboards; fitted machine tools in workshop and racks for tools, also gate valves in auxiliary steam pipe, and covered piping. Contractor's men cemented bilges. The vessel was accepted May 8, placed in commission June 20, and docked in August, 1891.

Boston.—Aligned two pistons; ground water valves and repaired their gear; repaired stop valve and overhauled starting-valve gear; packed pistons, trimmed valves, and did other work upon main and auxiliary air and circulating feed and bilge pumps; overhauled crosshead brasses; overhauled line-shaft bearings and repaired friction brake; examined holding-down bolts. Calked leaky seams about all boilers, and renewed or expanded tubes in several; fitted additional stay rods in all; ground or overhauled stop and safety valves, checks, and blows; scaled all boilers; overhauled dampers and renewed zincs. Overhauled or repaired auxiliary con-

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denser, pipes and valves of compartment and flushing pumps, heaters, distillers, and blowers, ice machine and launch machinery; scraped ship's side within department; repaired anchor, dynamo, and gun-training engines, and assisted navy-yard force as much as possible. Men at the New York yard removed defective crank shaft and substituted new one; repaired piston rods; secured main pedestals; aligned; engine-bearings and shifted bleeder-valves; calked boiler shells; patched furnaces, expanded tubes and partially fitted shaking grate bars; renewed platform and flushing pumps and fitted evaporator. Has been in continuous commission since May 2, 1887, and was docked in January and May, 1891. Knots, 9,194 in three-quarters.

Brooklyn.—The navy-yard force at Norfolk removed portions of machinery which could be utilized in other ways, and the vessel was sold March 25, 1891.

Camanche.—Preservation of machinery; also overhauled outboards and put engines together after examination. In dock November, 1890.

Canonicus.—Besides routine means for preservation of machinery, overhauled main pistons, safety valves, and turret-turning gear.

Catalpa.—The force at the New York yard made renewals or repairs to various brasses, valves, pipes, and bolts.

Catskill.—Preservation of machinery; also examined a main piston and one air pump, and worked on the *Ajax* and *Wyandotte.*

Charleston.—Overhauled main piston springs and aligned three pistons; refitted eccentric brasses, stop and throttle valves; overhauled relief valves; overhauled plunger, valves, and guards of air pump; fitted crank-pin brasses of circulating-pumps; overhauled feed and bilge pump brasses and valves; overhauled and fitted crank-pin brasses; trued cross head journals and brasses; filed thrust bearings; overhauled turning engine; examined holding-down bolts; overhauled tachometer gear and governor. Calked leaky seams in boilers; renewed, expanded, ferruled, or plugged leaky tubes; ground stop valve; overhauled safety valves and checks; repaired surface blow; worked on dampers and air ducts; fitted uptake and connection doors; scaled boilers; made hangers and fitted new zincs. Repaired, renewed, fitted, or overhauled outboards, auxiliary condenser, feed and bilge pumps, flushing and evaporator pumps, blowers, ash hoist, evaporator, heaters, siren, fire mains and coal cars, steering and dynamo engines, hydraulic accumulator; did several jobs for deck and sick-bay; made gun-carriage bolt for *Nipsic*, and assisted in repairs to the *Itata.* The navy-yard force at Mare Island secured propeller nuts, renewed some boiler tubes, raised smoke pipe, braced uptakes, refitted dampers, repaired pumps, and fitted blowers for double-bottoms. Machine shop at Honolulu furnished a valve stem for flushing pump. Placed in first commission December 26, 1889, and docked in January and April, 1890. Total knots, 20,324.

Chicago.—Overhauled main and cut-off valve gear, rings and springs of pistons, relief valves and reversing engine; removed governor and piping; overhauled oiling gear and water service; aligned piston of air-pump engine; overhauled circulating, feed, and bilge pumps; scraped and fitted crank-shaft brasses and overhauled main bearings; overhauled beam center and fitted brasses; aligned crossheads; fitted thrust-bearing rings; overhauled spring bearings and examined holding-down bolts; chipped and calked boiler seams; renewed or expanded tubes; overhauled safety valves, checks, and blows; cemented girth seams; scaled some boilers and repaired brickwork in several; overhauled furnace doors and tested gauges and some of the boilers; overhauled sea valves; repaired and adjusted auxiliary feed, distiller, tank, flushing, and drainage pumps; overhauled ash hoist, ventilating, steering, and anchor engines, evaporator and distiller coils, ice machine, filters and heater pipes; trued commutator for dynamo; overhauled steam launch and whaleboat machinery, bunkers and doors, and compartment valves; made fittings for lathe and forge; worked for ordnance and other departments; scraped and painted iron skin of ship in all engine and fire rooms. The navy-yard force at New Yord worked upon main valves, link blocks, lagging, reversing engine, pins of beam ends, holding down bolts; boiler seams, rivets, piping, brickwork, door linings, smoke-pipe ladders; steam discharge, and receiving pipes; flushing pump, sluice valves, ash hoist, air-tight bulkhead, evaporator and distiller coils, heaters, and the whaleboat machinery. A breakage which occurred at the beginning of the next fiscal year was repaired by the force at the Norfolk yard. In commission since April 19, 1889; docked in January and June, 1891. Knots during three-quarters, and incomplete, 9,884.

Cohasset.—Overhauled machinery generally and repaired feed pump; recemented boiler leg and renewed part of smoke-pipe apron; preserved machinery while laid up.

Concord.—Examined all cylinders and pistons and renewed springs in two of the latter; examined air and circulating pump valves and renewed broken studs; fitted liners for main brasses; examined holding-down bolts and straightened propeller blades; altered boiler stop-valve stems; removed main steam pipe for repairs and replaced it afterwards; overhauled safety valve gear, check and blow valve chambers; tested two boilers and repaired hydrokineter valves; examined outboards; fitted stop valve in auxiliary steam pipe; overhauled auxiliary and flushing pumps; over-

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hauled and tried distiller and evaporator; fitted heaters; repaired steering engine; worked upon capstan and dynamo engines; made bolts for deck and overhauled steam-launch machinery. The navy-yard force at New York renewed ruptured steam pipe, fitted power tools in repair shop on board, and covered auxiliary steam and exhaust pipes. The contractor's men altered or renewed details in air and circulating pumps; strengthened bulkheads, erected ventilating fans, fitted drains to steam pipes, and covered small pipes. The vessel was accepted in February, and commissioned February 14, 1891; in dock April and June, 1891.

Constitution.—Repairs to heating apparatus; the work being done at the Portsmouth yard by men from the *Fortune.*

Cushing.—Overhauled reversing gear and equalizing valves, drains, and traps, reducing valve, air-pump valves and governors; filed crosshead pins and scraped brasses; rebabbitted shaft-bearing and lagged pipes; ground stop, safety, and check valves; assisted in removing and repairing boilers; strengthened boiler rests; altered casing and tested boilers; examined outboards; covered bunker floors; overhauled auxiliary stop valve, auxiliary pumps, and the heater pipes; worked on anchor and steering engines and did small jobs for deck. The yard force at Boston repaired boiler fronts and fitted bunker floors; at New York repaired reversing gear and blower engine; at Washington removed boilers for examination and repair and planed shaft-bearing. Men from the *Despatch* assisted in work on the boilers, and the contractor's force fitted new circulating pump crosshead, secured check valve seat and fitted evaporators. The log book for the last quarter has not been received owing to pressure of work on board. Placed in commission April 22, 1890, in dock August, 1890, and on marine railway February, 1891.

Dale.—Repairs were made at the New York and Washington yards upon steam-cutter machinery and heating apparatus.

Despatch.—Overhauled main valve gear; renewed spring and follower bolt in pistons; examined condenser tubes; overhauled air and circulating, feed, and bilge pumps and valves; examined crank-shaft bearings and holding-down bolts; patched boilers, calked leaks, and renewed or expanded tubes; overhauled checks and repaired bonnet; overhauled auxiliary and distilling pumps; made, enlarged, or repaired heaters; repaired steam-launch machinery, and experimented with propellers; made tools; repaired bunkers and braces; made or repaired articles for deck; removed coal for carpenters' work, and assisted in repairs to *Cushing's* boiler. The Portsmouth and New York yards supplied details for steam launch. In continuous commission since June 2, 1880; docked in September, 1890.

Dolphin.—Renewed defective follower bolts in piston; overhauled reversing engine; overhauled circulating, feed, and bilge pumps, their pistons, valves, and valve seats; overhauled crank pin, cross head, and main-bearing brasses, and aligned shaft bearings; overhauled thrust rings, and reduced lower half of stern stuffing box gland; calked seams, butts traps, expansion rings and rivets in all boilers; ground checks and auxiliary stop valves; fitted new casing to boiler fronts; scaled crown sheets and tube sheets, and renewed zincs; overhauled outboards; repaired pistons of compartment and distiller pumps; overhauled or repaired blower, ash hoist, capstan, and steering engines, and steam-launch machinery; renewed small parts in dynamo engine; scraped all bunkers and the ship's sides in department; worked for deck; discharged stores and coal. The navy-yard force at New York repaired piston rings, faced starting-valve seats, fitted main-bearing brasses, removed propellers and adjusted stern stuffing-box gland, fitted patches in furnaces of boilers, overhauled ash shutes, repaired anchor-engine and machinery of steam launch, overhauled evaporator and sluice valves, cut holes in crank pits, cemented bilges; and yard force at Norfolk generally overhauled engines, boilers, auxiliaries, and steam-launch machinery, completing the work in September, 1891. Docked in September, 1890; placed out of commission May 1, 1891.

Emerald.—Made slight repairs to machinery at the Portsmouth yard.

Enterprise.—Aligned pistons; overhauled main valve gear, also reversing and starting gear; examined condenser tubes; overhauled air, circulating, and feed pumps; repaired bilge-pump plunger; overhauled crank-pin brasses; aligned crosshead brasses; examined main bearings; overhauled thrust-bearing, and set up on holding-down bolts. Chipped and calked seams in boilers; patched tube sheet; expanded many tubes and renewed some; fitted new socket bolts; ground bottom blow; overhauled all safety-valves and repaired one, and scaled crown sheets. Examined outboards; overhauled auxiliary pump, and repaired pipe; overhauled distilling and flushing pumps, and steam-cutter machinery; repaired hoisting, ventilating, and steering engines, and did several jobs for deck. The force at the New York yard put machinery in good working order, and, after some service, overhauled water valves, blow valve, and auxiliary pumps; ground an outboard valve and repaired steam-cutter condenser. Machine shops at Colon and Havana repaired blower and auxiliary steam pipe and pump. Commissioned July 8, 1890; docked in September, 1890.

Essex.—Scraped main valve face and seat; overhauled reversing engine; ground

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stop and receiver valves; overhauled water valves; drawfiled main link; scraped wrist pin and brass; cleaned condenser tubes; renewed broken follower bolts in air and circulating pumps; overhauled valves of all pumps; examined thrust and set up on holding-down bolts. Ferruled leaky tubes in boilers; caulked rivets; ground checks and blows; cemented back connections; overhauled air-duct valves, also smoke-pipe hoisting gear, and scaled all boilers. Overhauled ash-hoist gear, valves of auxiliary pumps and heater pipes, repaired capstan engine valve and steam-launch engine, and cemented portions of bilges. The last log book has not been received, owing to difficulty in transmittal. The vessel was placed in commission April 22, 1890.

Fern.—Scraped cylinder; fitted bands about cylinder head; drawfiled piston rings; overhauled or fitted details in circulating, feed, and bilge pumps; examined holding-down bolts and tried engines; tested boilers and patched smoke pipe; renewed auxiliary pump; overhauled hoisting engine; secured search-light dynamo; did jobs for deck and assisted navy-yard men. The force at the New York yard fitted the vessel for service and at Portsmouth and Norfolk straightened and repaired crosshead; repaired piping and fitted various connections. Commissioned April 22, 1891, having been transferred from the light-house service; docked April, 1891.

Fortune.—Drawfiled crankpin and fitted two sets of brasses; overhauled crosshead brasses; fitted new cylinder head for reversing engine; examined condenser and tubes; flanged bleeder pipe; examined air and feed pump valves; overhauled circulating engine and fitted new ring to thrust-bearing. Calked seams in boilers; overhauled stop-check and bottom-blow valves and ground safety and other valves; put up dry pipe and fitted circulating plates. Examined outboards; overhauled auxiliary pump; made ash shute; worked for deck; assisted yard force in repairs; overhauled pump and repaired heating apparatus on the *Constitution*. Docked in December, 1890, and March, 1891. Placed out of commission April 22, 1891.

Franklin.—Renewed patches and replaced braces in boilers used for auxilary purposes; ground boiler valves; overhauled pump; repaired pipes of pumps, inspirator, and distillers; repaired and kept in order twenty-six heaters; overhauled machinery of three steam cutters, and made numerous minor repairs in other departments. The navy-yard force at Norfolk repaired, renewed, or rearranged piping; renewed small valves; repaired jacking wheel; altered boiler uptakes and fitted new smoke pipe and braces and made or repaired details of steam-cutter machinery.

Galena.—New boilers were to have been fitted at the Portsmouth yard, but on the passage from New York the vessel grounded and the hull was damaged. The total repairs were estimated to exceed 20 per cent of the original cost. The Department has not yet acted on the final report, but it is not probable that the ship will be repaired.

Hartford.—Work has long been suspended. The boilers and other parts of machinery have been removed to the shops at the Mare Island yard.

Independence.—Repairs to the steam-launch machinery.

Intrepid.—Preservation of parts not removed.

Iroquois.—Removed piston for attachment of new rod, dressed threads, and secured piston; ground water valves, overhauled relief valves in hot well; renewed defective valves in air, circulating, and bilge pumps; reduced brass of crank-shaft bearing; aligned intermediate shaft; examined thrust-bearing and holding-down bolts. Fitted several patches in boilers; expanded leaky tubes; overhauled safty valves and ground bottom blows; fitted bolts in boiler saddles; renewed smoke-pipe hoisting gear; scaled boilers and fitted zincs. Repaired ladders and floor plates, and overhauled steam-launch machinery. The Honolulu Iron Works made a new rod and nut for circulating pump, and a propeller for steam launch. In commission since June 19, 1889. Knots run, 8,668.

Ivy (formerly the tug *Monterey*).—Repairs have been made to the engine and boilers at the Mare Island yard.

Jamestown.—Maintained heaters and boiler, and repaired pumps; the *Richmond's* force made several fittings.

Jason.—Besides preservation of machinery, painted hull inside and out, and packed stern stuffing-box. Vessel in dry dock in April, and again in May, 1891.

Juniata.—The vessel was sold March 25, 1891.

Kearsarge.—Overhauled pistons, and renewed broken rings and springs; overhauled link motion and eccentric straps; renewed valve of reversing engine; calked expansion joint of exhaust pipe; overhauled air pumps and valves; overhauled circulating-pump engine, also main feed and bilge pumps; ground hot-well relief valve; plugged leaky condenser tubes; examined crank-pin brasses and line-shaft brass; dressed journals of spring bearings; overhauled roller-thrust and set up on holding-down bolts. Calked leaks in bottoms of boilers and in expansion rings; ground stop, check, and bottom-blow valves; patched blower duct and scaled boilers. Overhauled auxiliary pump, ash and blower engines; made clamp for crank in auxiliary steam pipe; repaired leaks in distiller and heaters; repaired differential pulley and

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bunker braces, and overhauled steam-launch machinery. The navy-yard force at New York repaired link blocks, make several brasses, also ferrules for boiler tubes; overhauled auxiliary steam pipe; faced discharge valve to auxiliary pump, and worked on air duct. Shop at naval station, Key West, made detail for feed pump, and machine shop in New York furnished piston rings. Placed in commission November 2, 1888. Knots run, 12,838.

Lancaster.—Aligned cross tail; examined all the principal parts of the engines and tried machinery. Calked leaky seams, stay bolts, and rivets, and ground safety and stop valves. Overhauled auxiliary machinery and pumps; arranged stores and spares, and assisted in getting on board those for other departments. The force at the Portsmouth yard connected up the engines after overhauling or renewing the parts; placed new boilers in position; fitted all appurtenances; tested the boilers and tried the machinery. The vessel was intended to serve as a gunnery ship, but the exigencies of the service required that she should be fitted out for the Asiatic station. Commissioned March 19, 1891.

Lehigh.—Preservation of machinery; also examined main cylinders, air, feed, and bilge pumps, and assisted in work on the *Ajax*, *Cattskill*, and *Wyandotte*.

Leyden.—Repairs were made upon the boilers.

Mahopac.—Besides the preservation of machinery, overhauled one main piston, and the men assisted on board the *Ajax* and *Cattskill*.

Maine.—Launched in November, 1890, and docked in July, 1891. The work of building is in progress.

Manhattan.—Preservation of main machinery; also overhauled steam-launch machinery, worked for deck, and assisted on board the *Ajax*, *Cattskill*, and *Wyandotte*.

Marion.—Repaired and secured reversing engine and overhauled the gear; examined main valves and pump valves; ground some of the boiler valves; overhauled outboards; tested machinery; assisted the navy-yard men and stowed tools, spares, and stores. The navy-yard force at Mare Island thoroughly overhauled the machinery, the work including reboring a cylinder, making a new piston and crosshead, fitting a new crank shaft until turning it developed a serious defect, when the shaft of the *Swatara* was removed and substituted; retubing two boilers; renewing the launch boiler and putting in order the auxiliary machinery. Placed in commission April 27, 1891; docked in July, 1890, and May, 1891.

Mayflower.—New boilers and triple-expansion engines have been proposed, but no action has been taken.

Miantonomoh.—Preservation of machinery. Steam has been raised for various purposes. The New York navy-yard force has completed work on revolving gear of the turret and pilot house, hydraulic lifting gear for gun-carriages, piping for dynamo and auxiliary machinery, and the work in the engineer department is, to all intents and purposes, completed.

Michigan.—Overhauled main valve gear; examined piston rings and springs, main journals, and holding-down bolts; repacked slip joints and air pumps; stopped leaks in boilers, ground safety valves, and tested boilers for thickness of metal; overhauled heaters; made tools; repaired the machinery of two steam launches; removed and reshipped stores and spars, and did several jobs for deck. In continuous commission over forty-six years.

Minnesota.—Took means for the preservation of the old engines; patched the old boilers remaining on board to serve as tanks; altered and partly renewed heater and other piping; overhauled launch machinery and worked for other departments of the ship. The navy-yard force at New York placed in position two boilers from the *Intrepid* for heating and pumping purposes; overhauled outboard and other valves, and removed the main propeller.

Mohican.—Aligned one piston; examined all the principal parts of the engine; refitted bolts in steam chest, circulating and feed pumps; drawfiled and polished crank-pin and scraped and refitted brasses; set up on holding-down bolts; renewed leaky tubes and cemented seams in boilers; ground safety, stop, check, and other valves; patched up take, smoke pipe and casing and tested gauges; renewed valve seat of auxiliary pump; repaired distilling pump; overhauled ash hoist, blower, and anchor engines. A machine shop at Sydney, New South Wales, made some articles and repairs, and at Honolulu three auxiliary pipes were fitted or altered. The yard force at Mare Island repaired link blocks and check valves; partly overhauled outboards, and made such repairs as there was time to work upon before dispatching the vessel to Bering Sea. Placed in commission May, 1885; docked May, 1891. Knots run, 10,701.

Monadnock.—According to the latest accounts received, the work has been continued of boring planing, turning, drilling, and tapping various cylinders, liners, heads, valves, covers, pipes, and rods of the engines, and of riveting, calking, tubing, and fitting the boilers.

Monocacy.—Renewed broken piston springs and follower bolts; overhauled condenser tubes thoroughly; trimmed air-pump valves; renewed valves in feed pump

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and overhauled bilge pump; overhauled main bearings and chocks in drag crank; renewed broken paddle, bolts, etc., in paddle wheels; calked leaky seams in boilers; overhauled stop and safety valves; ground blows and checks; repaired smoke pipe band and water guard; scaled boilers and overhauled zincs; repaired heaters, coal bunkers, and braces; overhauled auxiliary pumps; repaired steam launch and whaleboat machinery; scraped side of ship within department and cemented portions; drilled hull to ascertain thickness, and did jobs for deck. Machine shops at Shanghai, Nagasaki, and Yokohama refitted main follower bolts; retinned condenser tubes; fitted backing to iron bucket in paddle wheels; repaired piping; ground sea valves and cocks; repaired parts of whaleboat machinery, and boys from shore scaled portions of boilers inaccessible to men. In continuous commission since 1865; docked in November, 1890. Knots, 6,689.

Monongahela.—Maintenance of the heating and distilling plant, anchor engine, and steam cutter. Repair shop at the naval station, Newport, overhauled pump and steam cutter machinery, and did work for deck. A new boiler has been substituted for the old one in the steam launch.

Montauk.—Preservation of machinery.

Monterey.—In course of construction, and work progressing favorably in San Francisco.

Nahant.—Preservation of machinery, besides which work was done upon the stern stuffing box and outboard valves, while the vessel was in dock in April and May, 1890.

Nantucket.—Preservation of machinery. Closed boilers and made preparations for joining in the Ericsson obsequies, but orders were countermanded, and the vessel was towed to position.

Nellie.—Repairs have been made at the Mare Island yard upon engine, boilers, and appendages.

Newark.—Partly examined main valves and cylinders; overhauled air pumps and valves; overhauled packing of condenser-tubes and tested condenser; overhauled feed pumps and repaired air vessel; overhauled brasses of one crank-pin; examined crosshead journals; tried holding-down bolts and in dock repacked stern tubes. Calked seams in two of the boilers; overhauled outboards, auxiliary and flushing pumps; scaled evaporator; erected fittings in work shop; repaired siren and overhauled machinery of steam cutter and whaleboat; overhauled valves in double bottom, secured search-light stand, and did other work for deck; contractor's men erected evaporators and fittings; the ship was placed in commission February 2, 1891, and docked in April.

New Hampshire.—Removed portion of steam and water piping and steam pumps and replaced some heaters. No accounts have been received since October, 1890, after which time the ship was removed from Newport, R. I., to New London, Conn.

Nina.—The force at the New York yard repaired machinery.

Nipsic.—Aligned pistons; fitted brasses to crank-pin; renewed defective valves and bolt in air pump; removed packing, etc.; calked seams and fitted patches in boilers; overhauled safety valve and partly scaled crown sheets; overhauled auxiliary and distilling pumps; repaired steam launch machinery and heater pipes; did work for deck and transferred stores. Navy-yard force at Mare Island disconnected and made examinations of machinery, after which took means for its preservation. Put out of commission, October 29, 1890.

Omaha.—Aligned main pistons and renewed rings and springs; overhauled main valve and balance ring and aligned valve-stem crosshead; smoothed crank-pin and chipped and filed brasses; smoothed crank-shaft journal. aligned crosshead and dressed gibs; renewed air and circulating feed and bilge pump valves, calked and patched boilers and expanded tubes; ground safety, check, and surface blow valves and renewed damper connection; overhauled auxiliary pumps and valves, blowers, and ash-hoisting engines, distillers and piping; repaired steam launch and steam cutter machinery; transferred coal and stores. Machine shops at Yokohama and Shanghai worked upon piston ring, valve-stem slides, stuffing-box bush, outboard delivery pipe, shells and crowns of boilers, valves and pipes of pumps, details of steam launch and steam cutter machinery, and boys from shore scaled boilers in places inaccessible to men. Knots, 8,128. The ship was placed out of commission June 20, 1891, after a service of six years and one month.

Ossipee.—Available portions of the machinery were removed and the hull being condemned as not being worth new boilers, the vessel was sold March 25, 1891.

Palos.—Ground throttle valve; altered main valve gear; renewed piston springs and secured piston-rod nut; ground relief valves; renewed air-pump bucket valves and broken follower bolts; ground feed-receiving valve; refitted connecting rod and crank-shaft brasses; trued up air-pump wrist-pin on main crosshead and fitted liner to clutch-coupling feather; fitted patches on boilers and steam drums; renewed or expanded and ferruled many leaky tubes; made connection between steam drums; ground safety valve; fitted new steam jet to auxiliary boiler; scaled and tested all

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boilers; ground auxiliary steam stop valve; overhauled auxiliary pumps and fitted new pipes to them; fitted two plates to hull; patched collision bulkhead and did several jobs for deck; machine shop at Hongkong made delivery valve for feed pump. In continuous commission since June 11, 1870; docked in October, 1889.

Passaic.—Preservation of machinery; also prepared it for regular drills at the Naval Academy; put up new smoke pipe and overhauled boiler valves and cocks. The Norfolk navy-yard force made new smoke pipe and bottom blow valves.

Pensacola.—Made and fitted bolts in cylinder and steam chest bonnets; fitted new link blocks to valve gear, and stop valve to reversing engine; overhauled air-pump plunger, removed and replaced valve seats, and removed air and circulating pump valves; patched feed pump and pipe; changed crank-pin brasses; aligned crosstails and examined holding-down bolts; chipped and calked and cemented leaky seams in boilers and steam drums; expanded and ferruled tubes; fitted stay rods; overhauled checks and blows; worked on damper and conduit pipes, and scaled all boilers; examined outboards; overhauled auxiliary pumps and ash engine; repaired and changed lead of piping; overhauled lathe engine; repaired machinery of three steam launches; repaired sounding machine and worked for construction department. The navy-yard force at New York worked on bunkers and braces; cut well in bilge and connected receiving pipe, and repaired steam launch pump. Machine shop at Valparaiso repaired pipe. Knots, 9,965. In commission since April 4, 1885; docked in July and in August, 1890.

Petrel.—Overhauled piston, peaned ring, and renewed springs; overhauled main valve gear; fitted eccentric and straps; renewed valve link bolt; repaired receiver pipe; renewed air-pump valves and studs; repaired feedpump; scraped and refitted crank-pin brasses; refitted crosshead and crosstail brasses; scraped brasses and chipped binders of main bearing; overhauled annunciator and tried holding-down bolts; calked butt straps and rivets in boilers; expanded many tubes and ferruled some; ground check valves and renewed one; overhauled surface blow; overhauled air duct doors and repaired partition in smoke-pipe; overhauled outboards, main and auxiliary fire pumps, renewed or ground valves; renewed defective tubes and fitted air valve in auxiliary condenser; overhauled ash hoist, blower, and capstan engines; fitted evaporator piping and overhauled pump; repaired details of dynamo engine; overhauled water-tight doors; painted bottom skin of ship in department and repaired steam whaleboat machinery. Navy-yard force at Boston and New York repaired main steam pipe between cylinders; overhauled main valve gear, crank-pin binders, propeller blades, boilers, outboard-valve connections to hull, steam pipe to reversing engine, and made new parts for whaleboat. A machine shop at Bath made detail for whaleboat engine and one at Greytown repaired capstan engine stop valve. Knots, 9,349. Placed in first commission December 10, 1889; docked in August and November, 1890, and June, 1891.

Philadelphia.—Work of various kinds was done upon cylinders, pistons, main-valves and gear; throttle valves, reversing gear, water valves and gear; oiling and water service; crank-pin brasses, crossheads, condensers, and salt feeds; air pumps and their governors; feed pumps and safety feeds; bilge pumps, turning gear, tachometers, stern stuffing boxes, propellers and holding-down bolts; boiler seams and tubes; valves and doors; checks and blows; feed and blow pipes; hydrokineter, valves, gauges, zincs, damper gear and air ducts, and auxiliary smoke pipe; auxiliary, condenser, air and circulating pumps; injection and discharge pipes; fire, flushing and auxiliary pumps; blower, ash hoist, and ventilating engines; steering and dynamo engines, workshop and machine tools; steam winch and siren; steam launch and whaleboat; evaporator, ash shutes, oil-tanks; water bottoms, valves, and cement; bulkheads and water tight doors; limber holes; work for deck and for gun on *Petrel*. The navy-yard force at New York worked upon main steam pipe and stop-valves, valve rock-shaft, air and auxiliary pumps, evaporator and distillers, boilers, stop valves, safety valve gear, heaters, turning and dynamo engines, and machine tools. Contractor's men worked upon main and auxiliary condensers, air-pump engines, auxiliary pumps, evaporators and fittings, turning engine, electric light and wires, telephone and siren. Machine shop at Kingston, Jamaica, made copper pipes. In first commission since July 28, 1890; docked in December, 1890, and June, 1891.

Phlox.—Repairs necessary to keep the vessel efficient for practice trips with naval cadets to Baltimore, Norfolk, and elsewhere, assisting vessels and doing other duty.

Pilgrim.—No work was done, and the vessel was sold at the League Island yard March 25, 1891.

Pinta.—Renewed main-piston springs and follower bolt; trued up main link and block, and made new link pins; overhauled reversing gear; removed and cleaned condenser tubes; overhauled air-pump valves and circulating-pump shaft; overhauled bilge pump and draw-filed plunger; aligned cross head; scraped main bearing brass and tried holding-down bolts. Fitted patch to boiler; calked leaky butt-strap and socket rivets; expanded tubes and ferruled some; trued and ground safety valves; cemented water bottoms and drums. Patched pipe of auxiliary pump; re-

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paired distiller coil, fitted evaporator, pump, and piping; overhauled heaters, pipes and valves, also ash-hoist gear; overhauled machinery of three steam launches: cut door in bulkhead and limber holes in frames, and did several jobs for other departments; overhauled stores at Sitka, and made small articles for Indian manual training school. Machine shop at Victoria, British Columbia, made shaft for centrifugal pump and renewed cylinder lagging. In continuous commission since February 24, 1883; docked in May, 1891.

Portsmouth.—Minor repairs were made at the Norfolk yard, to keep distilling plant, etc., in order.

Puritan.—Preservation of machinery; besides which, rearranged steam pipes and connections for forced draft. In dock, February, 1891.

Quinnebaug.—The vessel was handed over to the Army for experimental purposes, was returned, and on March 25, 1891, was sold.

Ranger.—Renewed or refitted piston springs; overhauled stop valve and eccentric straps; fitted new reversing wheel; filed and scraped crank-pin brasses; overhauled wrist-pin journals; renewed air-pump valves and hot well relief valves; temporarily repaired stuffing boxes of air and bilge pumps; overhauled feed pump; set up on holding-down bolts. Calked boilers and expanded leaky tubes; ground or overhauled stop, check, and blow valves; scaled boilers, cemented bottoms and uptakes; strengthened base of smoke pipe; renewed bolts in boiler saddles and fitted chocks under boilers. Ground valve and renewed pipe of auxiliary pump; patched and braced bunker bulkheads; made details for steam launch; scraped and painted ship's frames in department; also boiler keelsons; cut out rivets from damaged plating, and did work for ship. The navy-yard force at Mare Island made reversing hand wheel and repaired machinery of steam launch. Placed out of commission September 14, 1891, after a continuous service since January 18, 1881.

Rescue.—Preservation of machinery until March 25, 1891, when the vessel was sold.

Richmond.—Examinations and overhaulings were made of pistons, link blocks, reversing engine, valves of all pumps, crank pin, and thrust brasses of engines; seams, rivets, and patches; check and blow valves and piping of boilers; valves, pipes, and other parts of auxiliary pumps, distillers, and heaters; ash, ventilating, capstan, and dynamo engines; machine tools and machinery of steam launch and cutter, and various details in other departments of the ship. Work was also done on the *Cohasset*, *Fern*, *Jamestown*, and *Monongahela*, and for three steam launches, four buildings and three shops at the naval station, Newport, R. I. The repair shop has been fitted with machine tools, and has already done much work which would otherwise have been sent to outside shops. The navy-yard at Norfolk did what could be done in the two weeks allowed towards aligning, refitting, renewing, overhauling, grinding, and repacking about the main engines; calking, patching, cementing, grinding, and refitting about main boilers, and overhauling auxiliaries, steam cutter and barge; and the Portsmouth yard made several articles. Commissioned January 20, 1887; docked in September, 1890.

Rocket.—Slight repairs were made upon the machinery by the navy-yard force at Boston.

San Francisco.—Examined important parts; overhauled condenser, circulating, feed, and bilge pumps; crank pin and cross-head brasses, and tachometers, and tried holding-down bolts. Calked shell seams in two boilers; ground blow valves and tested gauges; braced back connection of auxiliary boiler; refitted air-duct damper and overhauled furnace doors. Overhauled out boards; feed, fire, bilge, and flushing pumps; auxiliary condenser; ventilating, blower, and capstan engines; evaporators, distillers, and heaters; machine and other tools and stores; scraped, painted, and cemented hull of ship in department; worked upon gear of 6-inch gun and sent a working gang to the *Itata* for five days. Navy-yard force at Mare Island made spare parts; overhauled and changed lead of small piping and gear; fitted signaling apparatus, tachometers, and other details; erected machine tools in workshop and machinery in steam launch. The vessel was accepted in October and placed in first commission November 15, 1890. Docked in March, 1891. Knots, 5,661, during the single quarter in actual service.

Saratoga.—Necessary repairs were made upon boiler, heaters, and steam-launch machinery.

Saugus.—Preservation of machinery until the sale of the vessel March 25, 1891.

Speedwell.—Preservation of parts of machinery. The vessel has been condemned and offered for sale, but no bids were received.

Standish.—The navy-yard force at Norfolk made repairs authorized, and the force at the Naval Academy made subsequent repairs and did the overhauling necessary for practice drills and instruction in handling machinery, also for towing and other service. Docked October, 1890.

St. Louis.—Placed and connected heaters at League Island, and made necessary repairs.

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Swatara.—Dismantled high-pressure engine and set new crank shaft in place; overhauled running and standing parts of machinery until the return of the ship from the Asiatic station. The navy-yard force at Mare Island removed crank shaft and fitted it on board the *Marion;* after which took means for the preservation of machinery. The vessel was placed out of commission February 2, 1891.

Tallapoosa.—Ground stop valve; overhauled pump valves; removed broken air-pump rock shaft; overhauled paddle-wheel bolts. Calked leaky seams in boilers and renewed defective braces, trued and ground check valve; tested steam drum and boiler. Overhauled auxiliary pumps; repaired heaters, distiller, and their piping; overhauled capstan engine and steam-launch machinery, and did minor jobs for deck. Machine shop at Montevideo did work for steam launch. In continuous commission since January 11, 1886.

Terror.—Preservation of machinery.

Texas.—In course of construction at the Norfolk yard, Virginia.

Thetis.—Examined important parts; overhauled eccentrics and link blocks; renewed air-pump valves; overhauled crank-pin journals and refitted brasses; overhauled cross-head journal, and tested holding-down bolts. Expanded leaky boiler tubes; refitted leaky patch, overhauled auxiliary boiler and scaled and tested all. Ground or examined outboards; overhauled auxiliary bilge pump and distiller pump; fitted new valve in injection pipe; overhauled anchor engine, ash hoist and distiller; repaired machinery of steam launch and overhauled the launch of the *Ranger.* Navy-yard force at Mare Island overhauled connecting-rod brasses and altered eccentric; ground main injection; repaired main steam pipe; repaired auxiliary feed and bilge pumps, also injector and pipe; fitted flooring in shaft alley and altered steam launch. Knots, incomplete, 8,667 in three-quarters. This vessel has been in continuous commission since January 15, 1887; was docked in February, 1890, in March and again in April, 1891.

Triana.—Wrecked March 15, 1891, and name stricken from the register.

Triton.—Made repairs necessary for performing duties at the Washington yard, besides which the vessel made seventeen round trips with stores, etc., to the Annapolis proving ground; sixty-eight round trips to the Indian Head proving ground (some with tows), and trips to Norfolk, Wilmington, and various other places. On marine railway December, 1890i and June, 1891.

Vermont.—Made numerous examinations, repairs, renewals, and overhaulings incident to keeping in order the seven boilers, together with pumps and other machinery belonging to the receiving ship, cob dock, steam-ferry scow, two steam launches, the dynamo and several buildings.

Vesuvius.—Overhauled piston rings and springs, reversing engine and gear; filed and scraped cross-head brasses and overhauled crank-pin ditto; overhauled feed pump and valves and tried holding-down bolts; calked leaky seems in boilers and expanded leaky tubes; ground stop and check valves; overhauled surface blow valves and pipes; repaired damper gear and partly scaled boilers. Did work of various kinds upon blower, ash hoist, anchor, and dynamo engines; distiller, evaporator, heater, and their piping; several details for deck, and assisted men from machine shop. The navy-yard force at New York fitted new propellers, altered piping, tested gauges, put distillers and evaporator in position, and made connections; fitted dynamo piping and traveling bars; and men at the Norfolk yard repaired auxiliary steam pipe. In first commission since June 7, 1890; docked in August, 1890, and February, 1891.

Wabash.—Preservation of main engines, besides which overhauled auxiliary pumps, fitted heaters, overhauled steam pipes in various parts of the ship, repaired water pipes, made tank, put check valves in return pipes to boilers, fitted new boiler and condenser in steam cutter, and did some work for deck.

Wyandotte.—Besides taking means for the preservation of machinery, overhauled springs, etc., of one main piston, overhauled pump, safety valves, and signaling connections, made starting bolts for the *Mahopac,* made frequent repairs to the machinery of two steam launches and assisted on the other monitors in James River. The Norfolk yard furnished the machinery for one steam launch.

Wyoming.—Examined main valve, repaired check valve, auxiliary steam pipe and other details; also did work necessary for preservation of machinery and for the practical drills at the Naval Academy and instruction of cadets in handling machinery.

Yantic.—Chipped counter bore in cylinder, fitted displaced shoe and aligned piston; refaced relief valves, overhauled crank pin and wrist pin brasses; patched condenser tube sheet, aligned air and circulating pumps and renewed valves in them and in feed and bilge pumps, clasped crack in main shaft, overhauled ball thrust, examined holding-down bolts and assisted navy-yard men. Patched old boilers, removed fittings preparatory to replacing boilers with others, calked leaky seams, expanded leaky tubes, and scaled connections, overhauled braces and holding-down bolts, ground top and bottom-blow valves, overhauled checks and surface blows,

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made or repaired connections to auxiliary boilers, fitted forced draft system and tested main boilers; ground injection valve and overhauled outboards, overhauled auxiliary pumps, connected and overhauled distillers, renewed heater pipes and repaired launch machinery. The navy-yard force at New York overhauled pistons and made a new rod, faced stop-valve seat, repaired main steam pipes, overhauled main links and blocks, eccentrics, straps, and rods, made new stop valve for main feed and repaired ball-thrust cage, removed the old boilers and fitted two from the *Intrepid*, erected smokepipe and did work upon ash hoist, heaters, ventilators, steam cutter, bunkers, gratings, and floor plates, and built cofferdam in shaft alley to locate leak in stern of ship. Contractor's men covered boilers and pipes. In continuous commission since October, 1890; docked in May and September, 1891.

Yorktown.—Overhauled rings and springs of all pistons; fitted larger cylinder drains; filed crank pin and white-metaled the brasses; overhauled cross-head brasses; renewed defective valves of air and circulating pumps; turned plungers of main feed pump, fitted new one in auxiliary feed pump, and tried holding-down bolts. Calked seams and expanded and beaded old tubes in boilers; overhauled safety-valve gear, stop and check valves, also damper attachments; tested pressure gauges and scaled and tested all boilers. Overhauled outboards, auxiliary pumps, independent, flushing, and fire-pumps; renewed bilge-pump valves and repaired strainers; overhauled reducing valve; repaired ash hoists; overhauled blower and steering engines and ventilating-fan engine; overhauled distiller and evaporator and their pumps; repaired heater and renewed leaky pipes; made minor repairs on old steam launch, tested new one, and overhauled steam cutter; did small jobs for deck and assisted navy-yard men in repairs. The New York navy-yard force made connecting-rod bolts, turned main injection valve; expanded boiler tubes; repaired covering of boilers and piping; caulked feed tank; renewed suction of receiving main to compartments, and overhauled fittings of new steam launch; the force at the Norfolk yard repaired piping and valves; substituted steel tubes for iron ones in all boilers; fitted stays; caulked straps and seams and made or repaired parts for steam launch, distiller, and flushing pump. In first commission since April 23, 1889; docked in July, 1890, and January, 1891.

Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1891, upon machinery, boilers, etc., with outfits, stores, etc., of naval vessels.

Name of vessel.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.	Name of vessel.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.
Adams	$301.54		$301.54	Harbor defense ram*	$1,965.82		$1,965.82
Ajax and monitors		$10.13	10.13	Indiana*	1,972.86		1,972.86
Alarm	842.18	17.69	859.87	Intrepid	7.04		7.04
Alert	3,576.78	4.00	3,580.73	Iroquois		$439.92	439.92
Alliance	255.60	1,405.43	1,661.03	Ivy	2,473.21		2,473.21
Amphitrite	2,333.35		2,333.35	Jamestown	27.91	.68	28.59
Atlanta	24,131.79	1,176.63	25,308.42	Jason	533.05		533.05
Baltimore	1,871.03	17.36	1,888.39	Juniata	409.66		409.66
Bennington	2,643.33	168.64	2,811.97	Kearsarge	167.94	131.74	299.68
Boston	25,135.23	1,000.21	26,135.44	Lancaster	46,410.36	892.12	47,302.48
Brooklyn	776.04		776.04	Leyden	354.37		354.37
Camanche	1,317.88		1,317.88	Marion	39,228.14		39,228.14
Catalpa	1,226.07	72.94	1,299.01	Massachusetts*	2,612.86		2,612.86
Charleston	9,749.20	1,970.29	11,719.49	Mayflower	4.68		4.68
Chicago	6,260.02	6,131.07	12,391.09	Miantonomoh	36,889.14	255.08	37,144.22
Cincinnati	163,633.17		163,633.17	Michigan	3.52	8.92	12.44
Cohassett	84.48		84.48	Minnesota	2,770.11	90.53	2,860.64
Concord	856.78	1,146.94	2,003.72	Mohican	574.58	929.94	1,504.52
Constitution	32.24		32.24	Monadnock	46,613.49	616.33	47,229.82
Cruiser No. 6*	395.00		395.00	Monocacy	1,497.84	3,387.30	4,885.14
Cruiser No. 9*	487.37		487.37	Monongahela	2,956.18	2.55	2,958.73
Cruiser No. 10*	487.37		487.37	Montauk	579.40		579.40
Cruiser No. 12*	2,342.04		2,342.04	Nahant	739.65		739.65
Cruiser No. 13*	1,185.08		1,185.08	Nantucket	218.03		218.03
Cushing	2,109.83		2,109.83	Nelly	2,735.46		2,735.46
Dale	575.21		575.21	Newark	8,162.90	785.27	8,948.17
Despatch	140.47	317.97	458.44	New ferryboat	3,149.01		3,149.01
Dolphin	7,052.80	36.37	7,089.17	New York*	2,956.06		2,956.06
Emerald	209.58		209.58	Nipsic		71.76	71.76
Enterprise	2,257.49	649.15	2,906.64	Nina	2,904.07	5.28	2,909.35
Essex	302.67	1,055.78	1,358.45	Omaha	973.11	1,986.99	2,960.10
Fern	1,554.91	43.82	1,598.73	Oregon*	1,972.86		1,972.86
Fortune	770.46		770.46	Ossipee	587.08		587.08
Franklin	2,763.95	52.37	2,816.32	Palos		556.88	556.88
Galena	13,857.69	155.94	14,013.63	Passaic	93.36		93.36

* Draftsmen and writers.

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Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1891, *etc.*—Continued.

Name of vessel.	Machinery, boilers, etc.	Outfit, stores, etc.	Total.	Name of vessel.	Machinery, boilers, etc.	Outfit, stores, etc.	Total.
Pensacola	$166.61	$3,116.14	$3,282.75	St. Louis	$670.66	.....	$670.66
Petrel	3,118.42	469.95	3,588.37	Swatara	1,739.92	$702.91	2,442.38
Philadelphia	6,852.90	1,794.96	8,647.86	Tallapoosa	286 06	1,124.24	1,410.30
Phlox	20.39	.....	20.39	Terror	5,611.04	.....	5,611.04
Pinta	204.68	359.32	564.00	Texas*	1,088.65	.....	1,088.65
Portsmouth	195.03	.....	195.03	Thetis	1,293.38	.....	1,293.38
Puritan	15,272.31	.....	15,272.31	Torpedo boat, No. 2*	1,350.50	.....	1,350.50
Quinnebaug	137.40	.....	137.40	Triana	302.63	.....	302.63
Raleigh	163,633.17	.....	163,633.17	Triton	1,079.87	38.24	1,118.11
Ranger	6,443.94	81.19	6,525.13	Vermont	160.77	.....	160.77
Rescue	25.44	.....	25.44	Vesuvius	5,831.35	399.99	6,231.34
Richmond	3,740.51	.....	3,740.51	Wabash	1,010.25	28.00	1,038.25
Rocket	138.47	42.91	181.38	Yantic	19,051.84	243.02	19,294.86
San Francisco	17,165.12	.....	17,165.12	Yorktown	9,823.22	1,000.00	10,823.22
Saratoga	407.94	.....	407.94				
Sangus	47.08	.....	47.08				
Speedwell	239.69	.....	239.69	Aggregate	764,689.86	34,994.89	799,684.75
Standish	3,568.41	.....	3,568.41				

*Draftsmen and writers.

PRESENT CONDITION OF THE MACHINERY OF NAVAL VESSELS WITH THE WORK REQUIRED.

The following statement shows the condition of the machinery according to the latest reports, together with the work needed to fit the vessels for sea service or to keep them on duty or in readiness during the next fiscal year:

Adams (third-rate cruiser).—At the Mare Island yard. Condition generally good, but parts of main engines require overhauling and boilers need slight repairs. Time estimated to fit machinery for service, ninety days.

Ajax (single-turret monitor).—In ordinary near Richmond, Va. Condition good except that ventilating pipes need renewal. Time required, ten days with full force.

Alarm (torpedo ram).—In ordinary at the New York yard. Condition good to fair, but Mallory propeller gear considerably worn.

Alert (third-rate cruiser).—On special service in Bering Sea. Condition good when age of machinery is considered, but the hull is not, perhaps, as strong as it should be.

Alliance (third-rate cruiser).—In commission on the Asiatic station. Condition of all important details good to fair.

Amphitrite (double-turret monitor).—In ordinary at the Norfolk yard. Condition good, but boilers and pipes need to be covered. Time required to get machinery ready for service, sixty days with present force.

Atlanta (second-rate partially-protected cruiser).—In commission with the squadron of evolution. Condition good; has been thoroughly overhauled at the Norfolk yard.

Baltimore (first-rate protected cruiser).—In commission on the Pacific station. Condition good, sufficient and efficient in important details.

Bennington (third-rate cruiser).—In commission. Condition new and good.

Boston (second-rate partially-protected cruiser).—In commission on the North Atlantic station. Condition of engines good, as machinery has undergone thorough overhauling, but the boilers are only fair.

Brooklyn (second-rate cruiser).—Sold March 25, 1891.

Camanche (single-turret monitor).—In ordinary at the Mare Island navy-yard. Condition good; can be made ready for sea in three days.

Canonicus (single-turret monitor).—In ordinary near Richmond, Va. Condition of important details good, except boilers and ventilating pipes, which are defective. Time required to prepare machinery for service, thirty days after receipt of material.

Catalpa (tug).—In service at the New York yard. In good condition at last report.

Catskill (single-turret monitor).—In ordinary near Richmond, Va. Condition of important details good; time required to get machinery ready, eight days with full force.

Charleston (second-rate protected cruiser).—En route to the Asiatic station. Condition good to fair; some boiler tubes are beginning to pit through irregularly.

Chicago (first-rate partially-protected cruiser).—Flagship of the squadron of evolution. Condition good, as the machinery has been overhauled at the Norfolk yard.

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Cohasset (tug).—In service at the training station, Newport, R. I. Condition of all important details fair.

Concord (third-rate cruiser).—In commission on the North Atlantic station. Condition of details new and good.

Constitution (sailing vessel).—At Portsmouth, N. H. The condition of boiler, pump, and heaters is presumably good for the purposes required.

Cushing (torpedo vessel).—In commission at the naval station, Newport, R. I. Condition of all important details good at last accounts received.

Dale (sailing vessel).—Receiving ship at Washington, D. C. Condition of boiler, pump, and heating apparatus fair; of steam cutter, excellent.

Despatch (dispatch vessel).—On special service. Condition of important details good or fair except boilers, which are nearly worn out.

Dolphin (dispatch vessel).—At the Norfolk yard. Repairs and other work having been completed September 12, the condition is good.

Emerald (tug).—In service at the Portsmouth navy-yard. Condition fair at last accounts.

Enterprise (third-rate cruiser).—On special service at Annapolis, Md. Condition of important details fair, but the boilers have been in the ship ten years.

Essex (third-rate cruiser).—In commission on the South Atlantic station. Condition of important details good to excellent, except that one cylinder is slightly cracked. The last log book is not received.

Fern (fourth-rate vessel).—On special service running between navy-yards. Condition of details fair to poor on account of age.

Fortune (tug).—At the New York yard. Condition of machinery fair; one boiler was wearing out and shaft was out of alignment.

Franklin (old-type frigate).—Receiving ship at the Norfolk yard. The main engines would require extensive repairs; distilling and heating boilers are in fair condition.

Galena (third-rate cruiser).—At the Portsmouth navy-yard. The vessel will probably be sold, the hull having been damaged by running aground.

Hartford (second-rate cruiser).—At the Mare Island navy-yard. Very extensive repairs would be needed to fit the ship for sea, and about five months' time would be required after receipt of material. The final disposition of the vessel has not yet been decided upon.

Independence (sailing vessel).—Receiving ship at the Mare Island yard. The steam launch is presumed to be in fair condition.

Intrepid (torpedo ram).—At the New York yard. Most of the machinery has been removed.

Iroquois (third-rate cruiser).—In commission on the Pacific station. Condition fair except that boilers will probably require thorough overhauling in a year.

Ivy (tug).—In service at the Mare Island navy-yard. The condition should be fair, as repairs have been made.

Jamestown (apprentice training ship).—On a cruise. Condition of boiler, heaters, and pumps supposed to be fair.

Jason (single-turret monitor).—In ordinary at the League Island yard. Condition fair, but boilers need repairs. Time required to get machinery ready for service, sixty days.

Juniata (third-rate cruiser).—Sold March 25, 1891.

Kearsarge (third-rate cruiser).—In commission on the North Atlantic station. Condition of important details, good to fair.

Lancaster (second-rate cruiser)—En route to the Asiatic station. Condition good, but machinery is of old type.

Lehigh (single-turret monitor).—In ordinary near Richmond, Va. Condition of important details, good; time required to prepare machinery for service, eight days with full force.

Leyden (tug).—In service at the Portsmouth navy-yard. Supposed to be in fair condition.

Maine (armored cruiser).—In course of construction at the New York yard.

Mahopac (single-turret monitor).—In ordinary near Richmond, Va. Condition good, except that boilers and other details are defective; time required to get machinery ready for service, thirty days after receipt of material.

Manhattan (single-turret monitor).—In ordinary near Richmond, Va. Condition good except that boilers and other important details are defective; time required to prepare machinery for service, thirty days after receipt of material.

Marion (third-rate cruiser).—En route to the Asiatic station. Condition good and boilers fair, machinery refitted; some difficulty with the reversing gear should be overcome in time.

Mayflower (tug).—At the Norfolk navy-yard. No decision has been arrived at in reference to new machinery proposed.

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Miantonomoh (double-turret monitor).—At the New York yard; condition, good; the machinery is essentially ready for service.

Michigan (fourth-rate paddle-wheel steamer).—In service on the Great Lakes; condition good to fair, but boilers poor; the engines are about 47 years old and the boilers 32.

Minnesota (old-type frigate).—Receiving-ship for boys at New York; condition of main engines, fair; the old boilers not removed are used as water tanks; new boilers and other details for heating ship, good.

Mohican (third-rate cruiser).—In commission on the Pacific station; condition of important details, good to fair.

Manadnock (double-turret monitor).—Under construction at the Mare Island yard; the machinery is approaching completion.

Monocacy (third-rate paddle-wheel steamer).—In commission on the Asiatic station; condition of important details, good, but cracks, not serious as yet, have developed in the piston rod and one main shaft.

Monongahela (apprentice training ship).—On a cruise; the boiler and distilling apparatus are reported as not having sufficient capacity.

Montauk (single-turret monitor).—In ordinary at the League Island yard; condition of engines, fair; boilers need repairs; time required to fit machinery for service, sixty days.

Monterey (armored coast defense vessel).—In course of construction at San Francisco, Cal.; condition, good.

Nahant (single-turret monitor).—In ordinary at the League Island navy-yard; condition fair, but boilers need repairs; time required to get machinery ready, sixty days.

Nantucket (single-turret monitor).—In ordinary at the New York yard; condition of important details, good to fair; time required, ten days with full force.

Nellie (tug).—In use at the Mare Island yard. The condition should be good, as the machinery has been repaired.

Newark (first-rate protected cruiser).—In commission with the squadron of evolution. Condition good.

New Hampshire (old-type frigate).—Receiving ship for boys at New London, Conn. The heating apparatus is in poor condition and needs extensive repairs.

Nina (tug).—In service at the New York yard. Condition of machinery believed to be fair, as repairs have been made upon it.

Nipsic (third-rate cruiser).—At the Mare Island navy-yard. Condition of important details fair, but engines and boilers need overhauling and repairs. Time required to get machinery ready for sea, ninety-five days.

Omaha (second-rate cruiser).—At the Mare Island yard. Important details require renewal or thorough overhauling.

Ossipee (third-rate cruiser).—Sold March 25, 1891.

Palos (fourth-rate gunboat for coast and river service.)—In commission on the Asiatic station. Condition of engine good, of boilers indifferent.

Passaic (single-turret monitor).—In service at the Naval Academy, Maryland. Condition fair; time required to get machinery ready, six days; but for extended service, about two months, and extensive overhauling at a navy-yard would be needed.

Pensacola (second-rate cruiser).—In commission on the Pacific station. Condition of important details generally good, but wood around some holding-down bolts is rotten.

Petrel (fourth-rate cruiser).—In first commission. Condition of important details good to fair; part of the boiler tubes poor.

Philadelphia (first-rate protected cruiser).—In commission on the North Atlantic station. Important details in good condition.

Phlox (fourth-rate paddle-wheel steamer).—In service at the Naval Academy, Maryland. Condition, poor; the engine is 27 years old and the boiler 15; the latter is nearly worn out, but the condition of the hull would not warrant the expenditure for a new boiler and overhauling the engine.

Pilgrim (tug).—Sold March 25, 1891.

Pinta (fourth-rate gunboat for coast and river service).—In commission in the North Pacific. Condition of important details good or fair, but boiler tube sheets are getting thin.

Portsmouth (sailing vessel).—Apprentice training ship. The distilling plant is believed to be in fair condition.

Puritan (double-turret monitor).—At the New York yard. Condition of important details good. Time required to get machinery ready for sea, five months.

Quinnebang (third-rate cruiser).—Sold March 25, 1891.

Ranger (third-rate cruiser).—At the Mare Island yard. The engines need alignment; the boilers (eleven years old) are completely worn out; portions of the hull framing are also badly corroded.

Rescue (fire-tug).—Sold March 25, 1891.

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Richmond (second-rate cruiser).—Receiving ship for boys at Newport, R. I. Condition of important details good to fair, but the machinery is of old type.

Rocket (fire-tug).—In use at the Boston navy-yard. Condition of machinery supposed to be fair.

San Francisco (first-rate protected cruiser).—In commission on the Pacific station. Condition good.

Saratoga (sailing vessel).—In service as the public marine school-ship of Pennsylvania. The heaters and steam launch are presumed to be in fair condition, as repairs were made upon them.

Saugus (single-turret monitor).—Sold March 25, 1891.

Speedwell (tug).—Offered for sale; no bids were received.

Standish (tug).—In use at the Naval Academy, Maryland, for practice in handling machinery. Condition good to fair, but the engine was built in 1865 and the boilers are more than 11 years old.

St. Louis (sailing vessel).—Receiving ship at League Island. The heating plant has been newly placed on board and should be in good condition.

Swatara (third-rate cruiser).—At the Mare Island navy-yard. The machinery would require overhauling and some renewing, but the vessel is likely to be sold.

Tallapoosa (third-rate paddle-wheel steamer for river service).—In commission on the South Atlantic station. Condition of important details good to fair, except air-pump rock shaft, which is broken. The vessel will probably be sold.

Terror (double-turret monitor).—In ordinary at the New York navy-yard. Condition good; time required to get ready for sea, one hundred and forty days.

Texas (second-rate battle-ship).—At the Norfolk yard. The work of construction is progressing.

Thetis (third-rate vessel for special service).—In commission on the Pacific coast. Condition of machinery, good to fair.

Triana (tug).—Wrecked March 15, 1891.

Triton (tug).—In use at the Washington navy-yard as fire-boat and for general purposes. Condition of important details good.

Vermont (sailing vessel).—Receiving ship at the New Nork yard. Condition of the plant on the *Vermont*, cob dock, steam scow, launches, and some buildings in the yard apparently good.

Vesuvius (dynamite-gun vessel).—In commission with the squadron of evolution. Condition of important details, good.

Wabash (old-type frigate).—Receiving ship at the Boston yard. Condition of auxiliary machinery, good. The engines and main boilers have been condemned as unfit for use.

Wyandotte (single-turret monitor.)—In ordinary near Richmond, Va. Condition of important details, good, except boilers, fair. Time required to get ready for service, twelve days.

Wyoming (third-rate cruiser.)—In service at the Naval Academy for instruction in handling machinery. The machinery and ship are unfit for sea service; the engines are about 32 years old and the boilers about 23.

Yantic (third-rate cruiser).—In commission. Condition good to fair, with slight crack in line shaft; engines overhauled, boilers transferred from the *Intrepid*.

Yorktown (third-rate cruiser).—In commission on the North Atlantic Station, but ordered to the Pacific. Condition of important details good to excellent.

NAVY-YARDS.

During the past year the construction of machinery for the *Cincinnati* and *Raleigh*, (cruisers 7 and 8), has been continued and new boilers for the *Galena* completed at the New York navy-yard; the loss of this last-named vessel to the service will require these boilers, whose construction was greatly delayed by non-receipt of material, to be utilized elsewhere. At the Mare Island navy-yard work on the machinery for the *Monadnock* has been continued and new boilers constructed for the *Ranger*. With the exception of the above the work at the various yards has been in the construction of machinery for small boats; in the repair or preservation of the machinery of naval vessels; in preparing stores and outfits for them; in constructing boilers for other bureaus as noted elsewhere, and in the care and preservation of the plant and machinery.

The great defect in all the navy-yards is the almost total absence of

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appliances for lifting and transporting heavy weights economically and quickly. Many of the shops are so designed and constructed that overhead traveling cranes with proper runways can not be placed in them and recourse is had to swinging pillar cranes, and hand cars or trucks, which are poor substitutes. Locomotive steam cranes are almost as useful tools as overhead traveling ones, but at present there is not one of either kind under control of this Bureau, though contracts have been made for three overhead and one locomotive crane for the New York navy-yard.

This want of appliances for handling heavy weights is made the more serious by the location of many of the shops, which were erected in the most out-of-the-way places and as far from the water front as possible. The railroad tracks in most of the yards are seldom in condition to allow the transportation of a marine boiler on them and, consequently, when new boilers are built for a ship in a navy-yard the cost of "skidding" them from the shop to the dock, where they can be reached by the derrick, is no inconsiderable item of expense.

Much time is also lost in obtaining the materials for small job orders. First a requisition has to be made and sent to the general storekeeper; then the material has to be weighed or measured out and sent to the shop; then if any material is left over it should be returned to the storehouse. A much simpler and better way would be to have a storeroom attached to the machine shop and small quantities of the articles in most common use kept on hand there, then when a job order was given the material for it could be obtained from this storeroom and charged against the order and a return of such charges could be made to the storekeeper weekly. This would cost no more than the present method and would be of great convenience; it would also save not only the time of the men kept running back and forth between the shop and the storehouse, but often of the men on a small job order as well.

Attention is called to the insufficient office force allowed nearly all the navy-yards. As a consequence, owing to the complicated system of accounts and returns, nearly all the clerical work is behind.

PORTSMOUTH, N. H., NAVY-YARD.

Work in the preservation or repair of machinery has been performed on the following vessels: *Constitution*, *Fern*, *Galena*, *Juniata*, *Lancaster*, *Monongahela*.

The auxiliary boilers for the *Lancaster* were completed and, together with the main boilers (originally intended for the *Franklin*), were placed on board and fitted and connected for service; extensive repairs to the machinery were completed and the vessel is now at sea.

A number of steam-cutter engines have been built; also a large number of spare parts for engines of this class already in service. New machinery is building for ferry launch *Emerald*.

The following work has been done for other Bureaus:

Ordnance.—Repaired recoil cylinder, altered side bracket, and repaired carriage of 6-pounder.

Equipment.—Inspected boilers.

Yards and docks.—Made two smokepipes for dry dock; retubed boiler; inspected boilers; made a number of small castings; made grate bars.

Construction and repair.—Inspected boilers; made castings; repaired boiler; furnished labor on air ducts.

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The expenditures during the year, other than for machinery of naval vessels, were as follows:

Civil establishment	$1,800.00
Superintendence and care and repair of shop machinery and tools	25,116.31
Running, firing, and repairing yard engines and boilers	885.90
Care and repair of yard steam launches	1,480.33
Boilers and machinery for launches for general use	9,464.18
Material and labor for other departments	804.10
Making stores for issue	6.00
Breaking up old material	488.72
Total	40,045.54

BOSTON NAVY-YARD.

During the last year contracts have been made for new shop boilers and for a complete boiler making plant of great power and the most modern design; when these have been received and set up the shops at this yard will be capable of constructing marine engines and boilers of any size and power, provided the shop engine and numerous power tools that were transferred to another Bureau in conformity with General Order 356 are returned. The boiler-making plant, to be paid for from appropriation for the improvement of machinery plant, will consist of the following tools: one boiler shell drilling machine; one hydraulic riveter with 126 inches gap and hoisting machinery for same; one hydraulic flanging machine with hoist; one set of vertical bending rolls; one steam accumulator and pump; one punching and shearing machine.

As new pumping machinery for the dry dock is now being erected and as the use of this dock will be required in the near future, for the needs of the new vessels of the Navy, it is recommended that this yard be again used as a repair station; there being no better time to examine and overhaul the machinery of a vessel than when she is in dock and many of the most important examinations and repairs being possible at that time only.

The advantages possessed by this yard as a repairing or building station are unsurpassd. Boston, being the wealthiest and most populous city of New England, and situated on one of the finest harbors on the coast, must have proper defenses and the defenses of the city will also protect the yard; being one of the principal seaports and manufacturing centers of the country materials of every description, and skilled labor of every kind can be obtained at all times; the skill of the mechanics in this vicinity has won for them a reputation that is world wide, and no better work has ever been done for the Navy than at this yard.

Slight repairs were made during the year to the machinery of the following vessels: *Wabash, Cushing, Rocket, Fortune.*

The expenditures during the year, other than for the machinery of naval vessels, were as follows:

Office expenses	$174.92
Care and handling of stores	521.23
Care and repair of shop machinery and tools	14,340.37
Running, firing, and repairing yard engines and boilers	1,371.03
Care and repair of yard steam launches	996.63
Shipments	224.54
Holidays	217.66
Total	17,846.38

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NEW YORK NAVY-YARD.

During the last year a new crank shaft (on hand) has been fitted in the *Boston* and her machinery thoroughly overhauled; a set of three boilers, originally intended for the *Galena*, have been completed and are on hand available for other services; alterations and rearrangement of much of the piping on the *Miantonomoh*, made necessary by changes in the plan of the vessel, have been completed; arrangements for forced draft are being made on the *Puritan;* an auxiliary condenser and pumps have been fitted on the *Vesuvius;* the boilers of the *Fortune* have been retubed; two boilers, originally in the *Intrepid*, have been placed in the *Yantic* and arranged to work under induced draft; two boilers, also from the *Intrepid*, have been set up on the *Minnesota* and connected for heating and auxiliary purposes.

Besides the above overhauling, preservation, or repair work, has been done to the machinery of the following vessels, or stores and outfits prepared for them: *Alarm*, *Atlanta*, *Baltimore*, *Bennington*, *Catalpa*, *Chicago*, *Concord*, *Cushing*, *Dale*, *Despatch*, *Dolphin*, *Enterprise*, *Essex*, *Galena*, *Intrepid*, *Kearsarge*, *Lancaster*, *Minnesota*, *Nantucket*, *Newark*, *Nina*, *Pensacola*, *Petrel*, *Philadelphia*, *Quinnebaug*, *Terror*, *Triana*, *Vermont*, *Yorktown*, *Michigan*.

Many of the shop tools have been overhauled and put in good order. The floating derrick has been docked and had such repairing and overhauling as was found necessary.

Notwithstanding the delay in the receipt of material, notably steel castings and boiler plate, excellent progress has been made in the construction of the machinery for the *Cincinnati* and *Raleigh*, and the work bears favorable comparison both as to quality of workmanship and cost with that done in any private establishment in the country. Not a single large casting has been lost and hardly any fitting has been found necessary when assembling the finished parts, so perfectly has the work been done. The engines are now being set up on the erecting bed in a temporary wooden shed that has been prepared for the purpose, and from this time forward their progress will be much more apparent. Unless further and unforeseen delays occur in the delivery of materials this machinery will be completed in ample time for the vessels.

Attention is called to the insufficient size of the present boiler shop, which (incompleted) is of but half the length designed for it. As a consequence much of the boiler work for the *Cincinnati* and *Raleigh* has to be carried on out of doors under such slight shelter as an old sail or awning stretched on poles, and much of the finished work has to be piled up outside and exposed to the weather. As a temporary expedient request has been made for the erection of two rough wooden sheds to serve as shelter to the workmen and the work, but it is earnestly recommended that the shop be at once completed to the size designed for it. It is further recommended that a wing be completed and fitted up for an erecting shop, and still another wing for a smithery and copper shop, thus completing the building according to the original design, and concentrating the shops under this Bureau as they should be. The gain in time and facility with which work could be done would pay for the additions recommended in a short time.

Contracts have been made for the following power tools and machinery, to be delivered in this yard: One 45-ton overhead traveling crane for boiler shop; two 15-ton overhead traveling electric cranes, with

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runway, dynamo, and engine, for foundry; one 150 horse-power stationary engine for electric welding plant and boiler shop; one locomotive steam crane; one lathe, to swing 72 inches and take 50 feet between centers; one hydraulic riveter with 126 inches gap. When all these are in place the shops will be in a much more efficient condition than at present, particularly in facilities for handling heavy weights.

It is greatly to be regretted that the appropriation for the improvement of the machinery plant at this navy-yard was not sufficiently large to allow the purchase of a large testing machine, of at least 600 tons capacity, one in which entire parts of a marine engine might be tested, and with which results might be obtained that would be of almost incalculable value not only to the service but to the country at large. The importance and need of such a machine have been pointed out time and time again, and I again renew the recommendation that an appropriation of $20,000 be made for the purchase of one, and $20,000 for a hydraulic bending press.

Some of the shop boilers now in use are about worn out and in the others it will not be safe to carry the steam pressure required for the new machinery, but as there are four marine boilers now on hand, two of which were removed from the *Puritan* and two from the *Intrepid*, that can not be utilized in any other vessels of the Navy, besides being of obsolete type, it has been determined to use them for shop boilers, and they are now being set up and connected for this purpose. This will render the purchase of shop boilers unnecessary for some years.

Machinery has been built for and erected in a number of steam cutters and spare parts made for machinery already in service.

Work has been done for other Bureaus, briefly as follows:

Construction and Repair.—Made a large number of castings in iron and composition, such as grate bars, formers, gratings, hawse pipes, gearing, rudder sleeves and pintles, air ports, sea valves; inspected and repaired steam generators; built two flue boilers.

Equipment.—Made a number of castings, such as brackets, parts of ranges, grate bars, sounding leads, hinges, spear heads, euphroes, etc.; inspected and repaired steam generators; made repairs to dynamo engines on *Boston*, *Yorktown*, *Philadelphia*, and *Pensacola;* fitted a number of oil shields and drip pans around and under dynamos.

Yards and Docks.—Made ram for pile driver; grate bars, sheaves, and miscellaneous castings; inspected and repaired steam generators; made repairs to steam fire engines.

Provisions and Clothing.—Inspected and repaired steam generators; repaired countershafting in mill; tended boilers and elevator engine.

Ordnance.—Handled guns with floating derrick; inspected and repaired steam generators.

The expenditures during the year, other than for the work on machinery of naval vessels were as follows:

Civil establishment	$2,999.95
Drafting	417.21
Office expenses	2,438.57
Care and handling of stores	4,000.34
Superintendence	48,007.50
Care and repair of shop machinery and tools	8,130.48
Running, firing, repairing yard engines and boilers	900.37
Improvement of plant with new tools, etc	27,233.43
Repairs and maintenance of floating derrick	3,786.19
Care and repair of steam launches	963.02
Boilers and machinery for steam launches	1,349.41
Labor and material for other departments	3,492.49
Experimental and test purposes	5,084.33

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Making stores for issue	$46.92
Breaking up old material	358.05
Shipments	258.58
Holidays	7,695.69
Miscellaneous	506.99
Total	117,669.52

LEAGUE ISLAND NAVY-YARD.

This yard has not been used for general naval purposes for several years, and no work has been done there except such as was found necessary for the preservation of machinery in shops and in vessels laid up.

The following, which appears in former reports, is repeated:

It is earnestly recommended that the shops at this yard be completed and fully supplied with tools of late design and of power to handle the heaviest marine-engine work.

With the new type of machinery in the Navy the facilities possessed by this Bureau elsewhere will soon be found insufficient, and in case of an emergency entirely inadequate. It is proposed to add to them by completing the shops in this yard, because, of all places on the Atlantic coast, the Delaware River is the best adapted for iron and steel ship-building; and board after board, appointed to select a place for naval establishment "for the construction of iron vessels, iron armor, and iron work of every description for naval purposes," has chosen League Island as the best site. Among its advantages the following are some of those enumerated in the report of the Commission on Navy-yards in 1883:

The neighborhood abounds in skilled labor in all that pertains to building modern ships of war, and is in the vicinity of unlimited supplies of coal and iron. A fine fresh-water basin for the preservation of iron vessels laid up "in ordinary" may be secured by dredging out the back channel. Dry docks may be constructed there in number sufficient for the prospective demands of the Navy. The neighborhood of the iron ship-building yards belonging to private parties, and the large machine shops to be found on the Delaware, would enable the Government to avail itself of their services in case of sudden emergency demanding a large amount of extra work.

Nowhere else are so many advantages to be found, and there is no reason why the Government should not avail itself of them.

The machine shop of this yard is limited in area, but contains some excellent tools of moderate size. For modern boiler work there are no facilities, and in the foundry, castings of five or six tons weight only can be made. To render the yard efficient, therefore, there should be added a boiler shop and foundry supplied with modern tools and appliances.

The expenditures during the year, other than those for work done on naval vessels, are as follows:

Civil establishment	$1,055.34
Care and repair of shop machinery and tools	12,911.95
Total	13,967.29

WASHINGTON NAVY-YARD.

The only work done in this yard during the past year has been preservation and care of plant and slight repairs and overhauling to the machinery of the following vessels: *Cushing*, *Dale*, *Despatch*, *Saugus*, *Triton*, *Rescue*.

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The expenditures during the year other than for work on the machinery of naval vessels were as follows:

Office expenses	$9.83
Laborer, inspection board, for stores	612.00
Care and repair of shop machinery and tools	1,656.24
Blue print apparatus at Bureau	954.44
Care and repair of yard steam launches	172.94
Holidays	103.74
Total	3,509.19

NORFOLK NAVY-YARD.

Work on small repairs, preservation, and alteration of machinery, has been done on the following vessels: *Amphitrite*, *Alliance*, *Brooklyn*, *Boston*, *Chicago*, *Cushing*, *Concord*, *Dolphin*, *Franklin*, *Fern*, *Fortune*, *Jamestown*, *Ossipee*, *Passaic*, *Portsmouth*, *Petrel*, *Phlox*, *Richmond*, *Standish*, *Speedwell*, *Triton*, *Vesuvius*.

Besides the above, the boilers of the *Atlanta* were repaired and reclothed, the auxiliary pumps were removed and others of different type fitted, the engines were thoroughly overhauled and a new boiler furnished for the steam cutter; the *Yorktown's* boilers were retubed, rebraced where necessary, and put in thoroughly good condition.

A number of engines and boilers were built for steam cutters and launches; the shop tools have had necessary repairs and overhauling; work in the way of boiler inspection and repair has been done for the other bureaus.

As has been stated in numerous former reports, Norfolk, from the mildness of its climate, accessibility by land and water at all seasons, ease with which materials of construction can be procured, and the constantly increasing amount of skilled labor in its vicinity that can be made available in case of need, possesses great advantages as a naval station. The yard already possesses a ship-building plant capable of turning out iron and steel vessels of any size, but the shops and tools under cognizance of this Bureau are not well adapted for the construction of modern marine engines and boilers, though most repair work can be done, being specially deficient in modern boiler-making tools and facilities for moving heavy weights. To place the yard in proper condition for this work will require the erection of an erecting shop into which the heavier tools, together with some new ones, can be placed and an overhead traveling crane fitted; a complete set of powerful modern boiler-making tools and overhead cranes in the boiler shop. To carry out the above will require an appropriation of at least $49,795.

The expenditures during the year, other than for work on the machinery of naval vessels, were:

Civil establishment	$1,299.95
Drafting	1,634.42
Office expenses	878.96
Care and handling of stores	2,056.72
Superintendence	5,352.29
Care and repair of shop machinery and tools	13,403.24
Running, firing, and repairing yard engines and boilers	3,332.89
Improvement of plant with new tools, etc	66.50
Care and repair of yard steam launches	1,403.70
Boilers and machinery for steam launches for general use	6,708.34
Labor and material for other departments and bureaus	896.27
Experimental and test purposes	531.94
Making stores for issue	197.84
Breaking up old material	1,013.33
Shipments	18.86
Holidays	1,510.00
Miscellaneous	517.02
Total	40,822.20

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MARE ISLAND NAVY-YARD.

During the last year new boilers were built for the *Ranger*, and are now ready to be placed in the vessel. The uptakes of the *Charleston* were properly secured and supported (they were settling from the heat), and numerous repairs were made to the machinery. The machinery of the *Marion* was generally overhauled and repaired, and the ship is now in service. These repairs were delayed long beyond the time necessary by the non-delivery of a new crank shaft that had been contracted for. After long delays and numerous failures on the part of the contractors to deliver a sound forging the contract was annulled, the crank shaft removed from the *Swatara* and fitted in the *Marion*, where it is now doing service.

Besides the above work, in the way of small repairs, overhauling, preservation of machinery, or making stores and outfits was performed for the following vessels: *Adams*, *Alert*, *Comanche*, *Mohican*, *Ranger*, *San Francisco*, *Swatara*, *Thetis*, *Pinta*, *Ivy*, *Nelly*.

Work was also done for the Coast Survey on the steamers *Hassler* and *Patterson*, and for the Fish Commission on the *Albatross*.

Machinery was fitted in a number of steam cutters, and repairs made to and spare parts for others already in service.

Good progress has been made in the construction of the machinery for the *Monadnock*, and the work will bear favorable comparison with that done anywhere.

Contracts have been made for the following power tools, to be paid for from the appropriation for the improvement of the machinery plant: One hydraulic flanging machine, with accumulator and pump and hoist for same; 1 set vertical bending rolls; 2 engine lathes; band sawing machine; bolt-heading machine; bar-iron shears; radial drill; slotting machine; planing machine; shaping machine; drill press; screw machine; vertical milling machine; universal saw bench and saws; grinding machine; emery wheel tool-grinder. When the above have been delivered and are ready for use the capacities of the shops will be greatly increased.

The great want in this yard, as in all the others, is the means for handling and transporting heavy weights. No thought appears to have been given to this either in the location or arrangement of many of the shops.

The following work was done for other bureaus:

Yards and Docks.—Made and fitted worm gear for crane scow; inspected and repaired steam generators.

Construction and Repair.—Inspected and repaired steam generators; constructed three 60-inch tubular boilers with steam drums for same.

Ordnance.—Made repairs to, and parts for, gun carriages.

The expenditures during the year, other than for the machinery of naval vessels, were as follows:

Civil establishment	$1,400.00
Drafting	1,627.60
Office expenses	2,427.02
Care and handling of stores	2,785.61
Writer and draftsman on new vessels	2,954.08
Superintendence	9,192.01
Care and repair of shop machinery and tools	31,790.85
Running, firing, and repairing yard engines and boilers	8,952.62
Improvement of plant, with new tools, etc	5,735.43
Care and repair of yard steam launches	1,199.83
Boilers and machinery for steam launches for general use	2,855.11

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Material and labor for other bureaus and departments	$4,162.40
Making stores for issue	9,583.51
Breaking up old material	577.54
Holidays	2,901.46
Miscellaneous	5,467.09
Total	93,612.16

PENSACOLA NAVY-YARD.

No work has been done at this yard except care of plant.
The expenditures were as follows:

Civil establishment	$999.98
Superintendence	1,252.00
Care and repair of shop machinery and tools	1,903.32
Running, firing, repairing yard engines and boilers	241.68
Care and repair of steam launches	903.23
Total	5,300.21

NAVL STATION, NEW LONDON.

No work has been done at this station except that necessary for the care of material;
The expenditures were as follows:

Care and repair of steam launches	$505.10
Miscellaneous	842.25
Total	1,347.35

NAVAL STATION, KEY WEST.

No work has been done at this station except preservation of stores and machinery:

Total expenditures for superintendence, care and repair of shop machinery and tools, steam launches belonging to the station, etc	$1,570.00

NAVAL ACADEMY.

Necessary repairs have been made to the machinery of the vessels and steam launches attached to the Academy.
There have been no expenditures other than those for work done to the machinery of naval vessels.

PERSONNEL.

The Engineer Corps.—It is with regret that I am again compelled to report that the number of engineer officers is insufficient for the proper performance of the duties belonging to them, and to emphasize the fact that unless measures are at once taken to remedy this condition and to stop the steady decrease in numbers, we shall before long have a painful awakening by a serious breakdown or accident on some of our vessels. There is a limit to even a naval engineer's endurance; and while the officers of the Engineer Corps will do their best to make all needed repairs and keep in efficient condition the magnificent machinery of the new vessels, from which the country justly expects so much and in which it takes a proper pride, they can go no further than

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the limit of their physical strength; when this has been reached the machinery must take care of itself.

I fear that the conditions which obtain with modern high-power machinery and the duties which come upon the officers charged with its maintenance are not thoroughly understood by Congress, and in explanation will state that the machinery of a modern war vessel is a collection of mechanisms, each composed of many parts and forming as a whole a vast and complicated organism which may be rendered useless by accidents to parts that might seem unimportant to the non-professional observer; added to this is the fact that it is not a mere labyrinth whose key once learned makes everything easy, but a moving, almost living, organism whose integrity depends upon the perfect working of each little part. The only thing that will insure this perfect working is the constant, unremitting, personal care and inspection of the engineer; it will not do to leave it to subordinates; they can, under proper direction, do the manual work needed, but if the engineer, by reason of his other duties, can not look after the principal details they will inevitably be allowed to take their chances until an accident shows that they have been neglected.

It is easy to see, in view of the foregoing, the condition of nervous strain which must come upon conscientious officers too few in number to give proper attention to details, but fully aware of the risk which is incurred. They go on with their work as faithfully as they can, but in constant dread of an accident for which they feel they should not be held responsible, but for which they may be made to suffer the implied disgrace of a trial by court-martial or the imputation of neglect of duty. Not long since a slight collision occurred between two naval vessels, which was directly traceable to lack of sufficient engineer officers. It can not, therefore, be a matter of surprise that engineer officers are breaking down from overwork or resigning to escape it. Indeed it has been sometimes claimed that, by reason of this nervous strain, engineer officers age more rapidly than others, and should be retired earlier in consequence.

Besides this first and most important result of paucity of numbers, is another almost as great—the necessity of abandoning other work of great value to the service and the country at large. Since the act of Congress of the 26th February, 1879, which permitted the detail of engineer officers as instructors in technical schools and colleges, officers have been so detailed in many parts of the country and have rendered most valuable service to the cause of technical education, as proved by innumerable letters from prominent officials of the Government and of colleges, commending their work and the strenuous efforts made to secure renewal of their details. In consequence of reduced numbers of the corps, it has become necessary to withdraw these details in order that the imperative demands of strictly naval duty might be met. The result has been that a number of schools have been unable to start or maintain a mechanical course, and others have had the efficiency of their courses seriously impaired.

Much as Congress has done for the technical education of the youth of the country, I doubt if any one thing has been of more benefit than the passage of the act above referred to, and I doubt further if it can, at this time, do anything that will be productive of better results in this respect than to so increase the Engineer Corps that these details can be continued; more especially at the colleges that have lately been established in the coal and iron districts of the Southern States; colleges where the instruction is to be more technical than classical, and

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which are to be important factors in the development of that section of the country, but which are still too young to have grown so rich by legacies and endowments that they can afford to be indifferent to or independent of this little aid from Government.

The necessity for an increase of the Engineer Corps is recognized throughout the service, and it was gratifying to find in the annual report of the Navy Department for last year that both the honorable the Secretary and the Chief of the Bureau of Navigation recommended it. The remarks of the former are so clear and forcible that I quote them here:

> Of equal importance with the above changes is the demand for an increase in the number of the Engineer Corps. *At present there are not enough engineer officers in the Navy for ordinary working purposes, and if no additional ships were building an enlargement of the corps would be necessary.* The important additions that are now being made to the fleet emphasize still further the urgent necessity of immediate action. The engines of the new ships, with their great complexity and delicate adjustment, require the highest kind of expert treatment, and unless a sufficient force is provided the safety of the ships will be seriously endangered. A bill for this purpose has been introduced in Congress, which provides also for the selection of a certain number of graduates of technical schools for appointment in the Engineer Corps. With the general principles underlying this bill the Department heartily concurs, and it earnestly asks that action may be taken upon it at the coming session.

The italics in the quotation are my own.

The Chief of the Bureau of Navigation says:

> The number of the engineer officers allowed by law is inadequate to the duties required of that corps.

In view of these indorsements of the Bureau's repeated recommendations for an increase of the number of engineer officers, and the reasons I have given, it is hoped that Congress will not longer delay action; and it is earnestly recommended that the Department again urge the early settlement of this important matter.

Inasmuch as the bill introduced in the last Congress has failed with the close of its sessions, I give herewith the features which I believe should be embodied in any measure for an increase of numbers.

The number of engineer officers should be at least 300, and even this number will be inadequate unless supplemented by a sufficient number of intelligent and skilled artificers and well-trained firemen. The division into grades should be in accordance with the duty to be performed and, as far as practicable, arranged so as to give reasonable promotion in order to keep the ablest young men in the corps. At present we are constantly losing bright and promising young men by reason of slow promotion and overwork.

I would also recruit the corps both from the Naval Academy (with a suitable engineering course as referred to later), and from competent graduates of the great technical schools and colleges under regulations to be formulated by the Department. I believe that many advantages will result as a consequence of drawing our supply of young officers from both these sources. Without going into great detail, I may say that I would provide for the selection of an equal number of cadets from the Academy and from the technical school each year to go through a two years' practical course at sea and on shore, somewhat after the manner of the post-graduate course for naval cadets at the present time. The number so selected should be in excess of the probable number of vacancies in the corps at the end of the two years. These vacancies should be filled by competitive examination so that the young men would have the incentive during the whole of the two years. My own experience, and that of many other officers, is that when young

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men know that they will certainly drop into a position by merely passing a comparatively easy examination only those of naturally great zeal and ambition will work as hard and faithfully as when they are under the spur of competition.

I have given the matter of the necessary number of engineer officers most careful study and consideration, and am prepared to submit, at the proper time, details in regard to the number needed and a scheme for recruiting the corps. I need not go into this here, as the important point is to secure action by Congress; when this is assured, I can submit a memorandum to the Department for transmission. I may say here, however, that the number of officers asked for is neither a guess nor an approximation, but is a careful estimate based on the actual duty to be performed at sea and on shore; it was made by considering the needs of every ship and every shore station, making allowance for the fact that all our ships will not be in commission at once, and that some provision must be made for sickness and leave. In other words, it is the minimum number which, in my opinion, will be adequate for ordinary circumstances in time of peace; it will be altogether too small in time of war.

It should be added that the proposed increase should be made gradually, in order to secure thoroughly good men. Twenty each year till the full number is reached would provide for this gradual increase, and still allow for the reduction due to retirements and the resignations of some of the younger men, who can not resist the tempting and lucrative positions offered them in various mechanical and electrical engineering establishments and technical schools. Much as we need the full number asked for *now*, I would regard it a misfortune to have the entire increase occur in one or two years, as it would be impossible to secure the required number of competent men in that time.

In previous reports I have called attention to the unsatisfactory course in engineering at the Naval Academy, due to its brevity, though aware that the instruction was as thorough as the limited time allowed. It is gratifying to note that the Board of Visitors at the end of the last academic year recommended an extension of this course and also that the selection of cadets for the engineer division should be made after two years instead of three as heretofore; this will enable a course of two years instead of one in technical studies and practical exercises to be pursued, and will turn out young men much better grounded in the fundamental principles of engineering and ready to take up the practical part with some prospect of becoming proficient. With the stimulus of competition against graduates of the technical schools, which I hope to see made part of the plan for increase of the corps, and the good foundation given them, the graduates of the two years' engineering course should make good engineers. I believe that this competition will have good results both on the Naval Academy course and the technical schools, as each will have an interest in its graduates making the best record; it will certainly save the service from becoming the refuge of men who can barely pass and who are frequently allowed to go through from mistaken sympathy when there is a sure place for them. When the graduate of the Academy knows that he must work to secure a commission he will take much more pains to perfect himself than when he feels that a place awaits him if he can reach an easily attained minimum.

One point in connection with the selection of cadets for the two years' engineering course should have special attention; it is that only those should be taken who have displayed some aptitude for engineer-

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ing and who volunteer for that division. As I remarked in a previous report, there have been cases where young men educated for something else came into the Engineer Corps merely for subsistence, admitting that they had no liking for the profession. It is obviously absurd to expect that such men can or will ever become proficient as engineers. I have already shown in this report that the duties devolving upon the modern marine engineer are exceedingly arduous, and that no one but a man devoted to the profession will ever make a success of it; consequently I hold that it is a radical mistake to select young men for the engineer division at the Naval Academy merely to make up the number necessary to fill vacancies, or who are willing to go into it because they think they are thereby certain of securing a commission which they might not otherwise receive. The old plan of appointing cadet engineers at the very beginning of the course had many great advantages, one of which was that a young man then knew exactly what would become of him when he graduated. At present probably every cadet, on entrance at the Naval Academy, hopes to reach the command of a fleet before he dies; this is a perfectly just and laudable ambition, but necessarily it must be given up by the one who goes into the engineer division. In consequence of the limit thus made to his advancement, and the arduous duties of the profession he is to enter, no one should be taken into the engineer division (as stated above) who does not volunteer for it. As a natural corollary to the foregoing, I believe that all who display aptitude for engineering, and who volunteer for the course, should be allowed to take it, no matter where they stand in the class. Until last year a system of selection had prevailed which I could not but regard as very unfair; the entire class was divided into as many sections as there were to be men in th e engineer division, and one was selected from each section, irrespective of whether one or half a dozen in that section might volunteer. It was with great pleasure that I learned that three of those who stood among the highest in the present first class had volunteered for the engineer division and had been permitted to enter it; this I believe to be a step in the right direction, for while I do not think that proficiency in mathematics and school work is necessarily a criterion as to a man's capability in the actual work of more mature life, it is, nevertheless, a proof of natural ability and capacity for work. It is to be noted here that for some time the Department has been recruiting the construction corps from young men of high standing in their classes; also that some very able young officers have resigned from the Engineer Corps to become assistant constructors, being induced thereto by the more rapid promotion, better pay, and exemption from sea duty with its confinement and necessary hardships.

On the recommendation of the Bureau the Department recently ordered to the New York navy-yard for instruction the five assistant engineers who received their commissions July 1, last. These young gentlemen had not been specially trained, even in the one-year course, and the Bureau felt that for their future usefulness they should be given every opportunity to acquaint themselves with the profession they were to follow. The building of the machinery for the *Cincinnati* and *Raleigh*, and the general work being carried on at this yard, offered an unusually good opportunity for instruction, and the interest taken by the commandant and the chief engineer of the yard gives assurance that every effort will be made to train these young men properly. They were not sent to "pick up" information, but are to follow a systematic course of instruction with a view of making them thoroughly acquainted with the details of the building of marine engines, and such other work as stand-

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ardizing instruments, testing materials, assisting on machinery trials, and in the preparation of data and computation of the horse-power. The Bureau expects good results from this course, and if it proves as successful as anticipated it will endeavor to give all young engineer officers such a course for at least a year.

In this connection I again call attention to the desirability of the establishment of a school of advanced instruction for engineer officers. Such provision is made for the instruction of other officers in ordnance, torpedoes, and similar subjects in which there are no more frequent changes or improvements than in steam engineering. Officers as high in rank as commander are permitted to attend these courses, and I deem it of equal importance for the efficiency of the Engineer Corps and the service that engineer officers should have the opportunity of perfecting themselves in their profession.

It is again urged that action should be taken looking to the abolition of the steerage. Although the existing laws and regulations seem to provide that all officers of the rank of ensign shall live in the steerage, and consequently make one or more cruises as occupants of this apartment according to rapidity of promotion, practically assistant engineers are the only officers, with rare exceptions, who are ever in the steerage for more than one cruise. Officers of the Medical Corps are promoted to the wardroom after three years' service and rarely spend the whole of that time on a cruising ship; only one pay officer is attached to a ship and, being thus head of a department, is in the wardroom; ensigns become wardroom officers when made "watch and division officers," which can be done by the commanding officer of the vessel. But nothing avails for the assistant engineer, and he may make two or even three cruises in the steerage, while he sees officers of other corps who entered the service long after he did, and are his actual juniors in rank, enjoying wardroom privileges; he meanwhile shares a common apartment with a number of cadets who are his juniors in age by from ten to fifteen years. This is manifestly a grievous wrong and could not have been intended when the law was passed which says "ensigns are steerage officers." I do not ask that anything be done to put any officer back in the steerage who can by any construction of regulations get out of it, but I earnestly recommend the abolition of the steerage. It is a relic of barbarism, and is as much out of place on a modern ship as would be a slow match for the guns; it is productive of the greatest discontent, and is an injustice to officers who are charged with important and responsible duties. Where the number of engineer officers on board ship is so small as at present it is inevitable that they should be up and around a great part of the night, and to preserve their health they should have a room where they may rest when off duty in the daytime. I can conceive no reason why all commissioned officers should not be members of the wardroom mess, and I earnestly recommend that the Department take such action as will secure this most desirable end.

This Bureau has always maintained that the best designer of marine machinery is the man who has learned by practical experience at sea and in charge of it, what to strive for and what to avoid. He knows that efficiency does not follow as a matter of course from complexity, but that simplicity, accessibility for inspection, facility in overhauling, and the smallest possible number of parts are the prime requisites. Many designs look very attractive on paper to the disastrously ingenious draftsman who has never seen them utterly fail to work at sea, but the trained engineer, who has lost hours of important time in repairing such puzzles, learns to avoid them almost by intuition.

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In its own designs, and in inspecting those submitted by contractors of details worked out by them, the Bureau has every part carefully examined by an experienced engineer officer, so that no device which can not be used with practical success will be admitted. That this method is productive of the best results is shown by the commendation bestowed on the Bureau's designs by eminent engineers from all parts of the world, and the eagerness with which they are sought by educational institutions and manufacturing establishments, for instruction and for imitation.

The Bureau has also endeavored, as far as practicable, to assign to duty as inspectors of machinery in process of construction the officers who will have charge of it on the first cruise. The great personal interest which they thus have in its efficient working insures the most careful inspection and tends to prevent any oversight which might come from the large number of details to be examined, involving an immense amount of painstaking and laborious effort.

These views of the Bureau relative to the designing and inspection of machinery for war ships have received most unexpected and forcible indorsement from abroad. The first lord of the English admiralty, in his statement explanatory of the navy estimates for 1891–'92, after admitting that, owing to insufficient boiler power, a number of vessels had failed to develop the indicated horse-power hoped for, and stating that in the remaining vessels of similar classes larger and heavier boilers would be fitted, continues as follows:

> The review, therefore, of the steam trials of the past year can not be said to be altogether satisfactory. The difficulties experienced have been overcome, but by changes reducing the estimated indicated horse-power and speed of the vessels. The engineer-in-chief deserves high credit for the assiduity and ingenuity which he has displayed in overcoming the difficulties connected with the designs of boilers which he did not originate. The specifications and details of marine engines are of so technical a character that none but a trained and practical engineer can adequately supervise or criticse them. Thus an unusually heavy responsibility is centered on the engineer-in-chief which can not be shared by members of the board of admiralty. The dimensions of a ship, its armament, and equipment can be criticised, altered, and discussed by naval officers, and laymen even, although they may have little technical knowledge of the principles of shipbuilding. Such a discussion or examination is not possible, to the same extent, except by trained experts, upon the specifications of a design for marine machinery. The hasty adoption of a faulty principle or immature idea in the designs of engines might not be detected outside the department preparing or initiating the design until the actual working of the engines themselves revealed the mistake made. (The Naval Annual for 1891, by Lord Brassey; p. 360.)

The statement above quoted also gives the information that when the designs for the machinery of certain vessels was under consideration—

> Three inspectors of machinery from the dockyards, as representing the latest views of seagoing engineers, were formed into a committee to coöperate with the engineer-in-chief. The result of their joint deliberations was a large increase in the boiler power of the cruisers and the addition of weight by the substitution of single for common combustion chambers. The board of admiralty propose to make permanent this committee, and to associate with its work certain remuneration. Their duty will hereafter be to examine all new designs, and as the members of the committee will be selected from the inspectors of machinery and chief engineers of the dockyard, who are periodically changing, it will continue to represent the latest views of practical seagoing and manufacturing engineers. In making this committee a permanent institution, the board of admiralty wish, at the same time, to record their full confidence in the engineer-in-chief, who has discharged his exceptionally onerous duties with ability and discretion. They believe that the establishment of such a committee will not only insure the necessary combination of theory and experience, but will be a guaranty that changes and innovations of importance in the machinery of the Navy will not be adopted without full discussion and adequate experiment. (*Ibid.*, p. 361.)

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The duties which it is intended that this committee shall perform are precisely those which the engineer officers attached to the Bureau of Steam Engineering now perform, and the formation of the committee is the best proof that in the most powerful navy in the world it has been found best to combine the seagoing and designing engineer, as has always been advocated by this Bureau.

I have gone into this matter of personnel at this great length because I believe it to be of the first importance. The newspapers give great space to descriptions of our new ships and machinery and their trials, while little is said of the people who make the movement of the ship possible, because they are out of sight and only attract notice when an accident occurs or speed can not be attained. Even the most perfect machinery will be useless unless it is placed in the hands of competent and zealous officers. In fact, the whole question may be reduced to one of dollars and cents; the machinery of our new ships is worth from $150,000 to $1,500,000, according to the power to be developed by it; neglect of this costly machinery means many thousands of dollars in repairs. Is it economy to save a little in officers salaries and spend many times as much in repairs, to say nothing of risking the loss of the ship or having her disabled when most needed?

I renew my recommendation of previous years that legislation be asked for providing an assistant to the Engineer-in-Chief, who shall be an officer of the Engineer Corps. Under existing law the chief clerk becomes Acting Chief of Bureau in the absence of the Engineer-in-Chief. The gentleman who now occupies the position is as competent for it as any man in the country, but, naturally, he has not the technical knowledge necessary for him to decide the professional questions constantly arising, and it is not fair that he should be compelled to accept the responsibility for official action which must be based on the opinions of others. In the Bureau of Medicine and Surgery provision has long existed for a professional assistant, and I consider there is the same necessity in this Bureau.

Enlisted men of the engineer's force.—The proper training and efficiency of these men is hardly second in importance to that of the officers of the Engineer Corps, and on it depends, to a very great degree, the efficiency of our ships as fighting machines.

Ever since I have had the honor to be at the head of this Bureau I have laid great emphasis, in each of my annual reports, on the importance of making adequate provision for a supply of thoroughly-trained mechanics and firemen. It has been gratifying to me to note that during the past year an elaborate discussion of this subject has been carried on by the officers of the English navy, and that they seem to hold, without exception, the same views that I have so often expressed as to the absolute necessity of having properly trained firemen and mechanics if the highest efficiency of a modern war vessel is to be secured.

It seems to me that the only course to be pursued in the training of firemen is one that affords the practical experience and conditions of actual service, and for this purpose I have often urged the designation of one of the vessels on the home station and fitted with forced-draft appliances. In this recommendation I have been cordially supported by the Chief of the Bureau of Navigation, and it is with pleasure that I can state that the *Miantonomoh* has been proposed for a training ship for men of the engineer's force, and that as soon as she is in commission a course of instruction will be begun. It would swell this report beyond its proper length to give in detail of what a proper course of

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instruction for enlisted men should consist, but I will mention briefly some of the points I consider of primary importance:

First, the fireman should be taught to fire. There is an opinion altogether too prevalent among persons otherwise well informed that anybody can shovel coal into a furnace, and that that is all that is required of a fireman; also, that the mere fact of putting a man in the fire room and giving him a shovel somehow or other turns him into a fireman. There never was a greater mistake. While it may not take as long to become a proficient fireman as to learn one of the ordinary trades, it nevertheless does require an apprenticeship and considerable experience. This is true, even with the conditions of natural draft and but 12 or 13 pounds of coal burned per square foot of grate per hour; with forced draft and 40 to 50 pounds of coal burned per square foot in the same time in large boilers, and 80 to 100 in small ones, the conditions are necessarily much more severe. A raw recruit looking into the seething mass of flames in a furnace under forced draft can tell nothing as to the condition of the fuel, but the trained fireman sees at a glance just where the coal should be put, and will guard properly against one great source of danger, bare grates at the back of the furnace.

Again; the proper cleaning of a fire has always been an important matter, but with forced-draft boilers it becomes of the highest importance that it should be done quickly, skillfully and well. In no way can this skill be acquired but by actual work under the conditions of everyday service.

Besides being trained in this work of firing, the men should also be trained as water tenders and oilers, the duties of these positions comprising a great deal more than indicated by the mere name. The men holding these ratings are petty officers, and should also, to some extent, be mechanics; that is, they must be able to do such work as grinding in small valves, fitting gaskets, packing stuffing boxes, etc. It is expected that on a training ship all these duties, as well as the almost innumerable other ones required of these ratings, will be thoroughly taught. These men are, besides, the ones usually sent to run the steam machinery of the steam launches and cutters, and it is necessary that they should be carefully taught this important work. The simple and heavy non-condensing engines that were till lately used in launches could be managed by any careful and experienced fireman; at present, however, these boats are provided with more powerful, lighter, and more economical machinery, necessarily more complicated, being of double and triple expansion, and its care requires men who have been properly trained in its use. Reports are received from almost every ship, when first commissioned, of trouble with the steam launches. After a year or so, when the men have learned to handle and take care of them, the reports are more satisfactory. These boats are frequently sent considerable distances from the ships, and it sometimes happens that the men who run the engines are the only persons in the boats with any knowledge of the machinery, or who would, in case of mishap, know what to do to remedy it. For such reasons as these the petty officers on the training ship should receive careful instruction in the manipulation of this machinery, and in the course to be pursued in case of accidents likely to happen.

The mechanics of the engineer's force are machinists, boiler-makers, blacksmiths, and coppersmiths. Proficiency in these trades can only be acquired by a thorough apprenticeship, which must be passed in regular work in the shops on shore. Their special adaptation to the

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needs of the Navy will come from experience on board ship, and a man who has learned his trade or handicraft can, in a comparatively short time, learn the modifications necessary for ship work. I wish here to again emphasize what I have so often said before, that no men should be appointed to these ratings except those who can show, by a thoroughly practical examination, that they are expert handicraftsmen. Formerly it was not an infrequent occurrence for a man who had been an unusually good fireman to be promoted to one of the mechanical ratings as a reward for good conduct or proficiency in something else. Such a system was wrong then, and would be worse now with the much greater amount of machinery of much greater complexity on board a modern ship.

I believe that the minimum age for entrance into the Navy should not be fixed too low, for the reason that it is advantageous to have as many men as possible who have some sort of mechanical skill, and if they are shipped when very young one is but seldom obtained who has acquired the least manual dexterity. Every engineer officer can testify to the value of even a small amount of such skill and knowledge of the use of tools on the part of the firemen, and in time of war or other exigency the modern ship which has the greatest number of mechanics in her crew will be kept in the best condition, or when damaged will be soonest repaired and again efficient and ready for service.

Very great difficulty has been experienced in securing competent men to serve as machinists in our ships. In one case, where a vessel was fitted out in one of our largest manufacturing cities, it was believed that the securing of the complement would be aided by permitting the chief engineer to select his men and satisfy himself as to their competence before sending them to the receiving ship for enlistment, but though the Bureau of Navigation offered every facility for such enlistment, only one or two men were secured out of a complement of eight. It is not altogether difficult to understand the reason for this; the pay of a machinist in the Navy is fairly good, and is about what all except leading men receive in the best shops on shore. It must be remembered, however, that on shore the mechanic works a certain number of hours only each day for his pay; if he works more it is overtime, and paid for at a higher rate; after his day's work is over he is his own master and can go and come as he pleases; if dissatisfied with his employment or employer he can leave at will, conditions that are, of course, utterly impossible on board ship. On shipboard, he is liable to be called at any time when off watch, day or night, for "odd jobs" or repair work, since the men on watch can not be called from their regular duties for this. It needs but a moment's thought to realize how frequent these calls are likely to be on a vessel that has, besides the main engines, scores of auxiliaries and almost innumerable mechanical appliances scattered all over the ship; and that owing to the small number of skilled mechanics allowed, the labor each one will be obliged to perform will be arduous in the extreme. Then, again, the mechanic on shore does most of his work in a shop, where he has light and air and room, besides all sorts of conveniences in the way of tools; on board ship he performs much of his work in a compartment where he often can not stand erect, where the air is foul and the light (always artificial) is sometimes electric but oftener from a smoky oil lamp. On shore he sleeps in a bed and goes to it when inclined; on ship he sleeps in a hammock and gets into it when told. The preceding is given only as an instance of the many things that operate against securing the men desired. The existence of a navy requires that discipline should be strict, and every-

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thing, as far as possible, done by rule. On the other hand, the modern navy being a new creation (not an evolution from one a little older,) in which steam and machinery take the place of wind and sails, the services of skilled mechanics are essential to its maintenance, and some scheme must be devised by which their services can be secured. Not only this, but after once obtaining them we must retain them.

Another reason for the difficulty is the very unsatisfactory conditions as to accommodations on board ship, which have hitherto prevailed. It is gratifying to note that in recent designs for large war ships the Bureau of Construction and Repair has endeavored to remedy this defect; and I believe that if it were generally known that on our new ships the higher petty officers will have excellent accommodations we would have less trouble to secure the men we need.

In a previous report I spoke of another possible reason for this difficulty of securing good men for these positions as arising from the entire lack of distinction in the treatment given to these men and to the firemen and coal heavers. In all modern ships a considerable amount of responsibility must fall upon the higher petty officers, and they are required to exercise authority over the enlisted men. Still, they have been almost invariably treated hitherto, as far as accommodation and privileges are concerned, the same as the latter. It is almost impossible, under these circumstances, for them to enforce their authority, and, after one cruise, very few of them enlist for a second. I consider that a marked distinction should be made between the higher petty officers and the men who are subject to their orders. As far as possible I think they should be treated more as non-commissioned officers in regard to permission to go on shore and similar privileges. If they have a place to themselves in the ship and are allowed leave on shore, when their services can be spared, without having their names placed on the general liberty list, I believe they will take pride in their positions, will recognize that they are considered important by the Department, and will, consequently, live up to their privileges. In any case I believe the experiment worth trying. If it fails we are no worse off than we are now, and if it succeeds we shall have settled a question which is now proving a serious embarrassment.

I wish also to call attention to the manner in which drills and exercises are carried on on board most vessels of the Navy and to the undue prominence which I believe is given to the so-called military drills.

It can not be denied that the first requirement for efficiency is that every man on a ship of war shall be thoroughly trained in the duties he is expected to perform in action, be it on deck or be it below; after he has been thoroughly trained in these it will be time enough to train him in other things. Just as the men forming a gun's crew have different stations and duties, some to sponge, others to load, others to point, prime, etc., and failure on the part of any cripples the piece, so the men of the ship's company are stationed, some in gun divisions, others in shot, shell, and powder divisions, and still others in the engineer's division; each with specific and well-defined duties to perform, no one of which can be said to be more important than the other; for as the final strength or efficiency of any organization is only that of its weakest portion so the efficiency of a ship's company can not be greater than that of its weakest, most poorly trained division. An exception may be taken to this if, as is claimed by many distinguished officers, the most formidable weapon possessed by any ship is the ship herself used as a ram. Now, the first requirement for a ram is that

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she shall have speed and handiness, and these depend directly on the power and condition of her motive machinery, which will make the engineers' division the most important of all, for on them depends the care, the condition, the handling of this machinery.

Now I believe that it has too often happened that important work on the machinery has been postponed or omitted because the firemen and coal heavers were sent on deck to take part in drills there, though in time of war all of them, and extra men besides, would be required in the engine and fire rooms. I do not for a moment suppose that this has been done with any desire to decrease the efficiency of the machinery but from thoughtlessness, and a desire to secure the highest efficiency in military exercises and the exaggerated importance assigned to them. It should not be forgotten that if the men of the engineer's force are so constantly drilled in small arms, great guns, landing parties, etc., that the machinery is neglected or slighted the vessel soon becomes what is called a "lame duck," and all the guns and gunnery and infantry tactics in the world can not make her either formidable or efficient. It should be also noted here that nearly every steam log received speaks of the insufficient number of firemen and their inefficiency; they are willing enough but have not had the necessary training. I believe, therefore, that for the present all efforts should be devoted to making them efficient as firemen and leave the matter of their proficiency in other things to future consideration. I believe, also, that nearly all the training necessary in small arms, infantry, torpedoes, etc., should be given them while they are on the receiving ships, and that after they have been transferred to cruising vessels they should only be sent on deck for drills and exercises at such times as their services are not required below, and I am further of the opinion that a general order should be issued by the Department regulating this matter of drills, making it uniform throughout the service and preventing the possible crippling of one of the most important parts of a ship.

In view of the importance of this matter of enlisting and training men for the engineer's force I am of the opinion that it would be a good plan to refer the whole subject to a board of experienced engineer officers, whose report would doubtless enable the Department to make such changes in existing regulations as would tend to greater efficiency in this important branch of the service.

CONTRACT TRIALS OF NEW VESSELS.

Since my last report the *Concord*, *Bennington*, and *Newark* have been subjected to the usual four hours' trial under forced draft, and while there were trifling mishaps which made a second trial necessary in each case, they were in no sense serious, and the machinery of all three proved well built and entirely satisfactory.

The *Concord* and the *Bennington* are exact duplicates, and they are identical with the *Yorktown*, except that they have closed ash pit forced draft, instead of that by closed fire rooms, and a different style of air pump.

The failure of the *Concord's* first trial was due almost entirely to the inexperienced fireman, who allowed the backs of the grates in some of the boilers to become bare, thus permitting the cold air from the ash pit to strike the tube sheets and cause leaky tubes. There was also a difficulty in securing an ample feed supply, due to faulty arrangement of the feed pipes. The second trial was a complete success in every way.

The *Bennington's* first trial was stopped by the breaking of the piston

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rod of one of the circulating pumps; everything else had worked perfectly. The second trial, which took place the next day, was entirely satisfactory.

The experience with the closed ash-pit forced draft on these ships was the same as on the *San Francisco*, and the greater comfort and feeling of security for those working in the fire rooms, as compared with the conditions when the fire rooms were closed, was very marked. The very small ratio of the power developed in the auxiliaries to that of the main engines is specially noticeable, and this is particularly true of the air and circulating pumps. On most of the ships previously tried an effort was made to secure economy of steam in these important auxiliaries by using compound engines run at a comparatively high speed. In these ships, however, simple engines were used, driving the pumps at low speeds, and the efficiency has certainly been increased. In our vessels now building the steam cylinders of similar pumps will exhaust into the first receivers, thus securing the economy due to high expansion while preserving the simplicity and efficiency of the pumps.

The *Newark* had three trials in all; both of the first two had to be discontinued after three hours on account of the breaking of a couple of bolts which secured the cap of the radius link of the Marshall valve gear of the starboard low-pressure cylinder. Everything else worked well in the first two trials, and the third was successful in every way.

On the trials of all these ships an effort was made to secure accurate data of the coal consumption, which has, on other trials, been estimated. For the trials of the *Concord* and the *Bennington* the coal was accurately weighed beforehand into bags containing 110 pounds each, so that it was an easy matter to secure absolutely trustworthy figures. For the *Newark* there was a supplementary coal consumption trial when two boilers were used with forced draft under conditions as nearly identical as possible with those of the contract trial, the coal being weighed on a platform scale as taken from the bunkers. It was assumed that the coal burned per square foot of grate would be the same in the two cases, and this is probably nearly true.

The results obtained from these accurate trials give the first trustworthy figures in regard to the coal required per horse power under forced draft full power that have ever been published. They show conclusively, what this Bureau has steadily maintained, that the figures so often published in estimates of coal endurance are entirely too low, and that the radii of action predicated therefrom are entirely too high. While these results will undoubtedly be a source of regret to all who had mapped out fields of usefulness for our vessels based on the more roseate view, there can be no doubt that the best interests of the Government have been subserved by finding out the truth. It is sure to be brought home to us some day, and it is far better that we should know it now, and act upon it by providing large coal capacity, than wait for the humiliation of a ship found to be helpless when we were most in need of her services.

While on this subject of coal economy, it may not be amiss to say a few words to clear up an impression, which seems to exist to some extent, that our vessels are decidely uneconomical as compared with those of the merchant marine in ordinary cruising, and it is pointed out that our vessels need recoaling after short runs while the merchant steamers make long continuous voyages. It is frankly admitted that our machinery is not as economical, but from the nature of things it can not be. The circumstances of the two services are entirely dissimilar. The economical merchantman has small engines and boilers for a large hull,

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while our ships have powerful machinery for small hulls. This machinery must be built to develop the maximum power which will ever be required, while ordinary cruising is done at a fraction of this power, a circumstance which is inimical to economy.

An interesting comparison of the conditions of the two cases is furnished by the *Baltimore* of our Navy and a merchant steamer called the *Iona*, which have about the same displacement—4,450 tons. The *Baltimore's* machinery develops 10,000 I. H. P.; that of the *Iona*, 700 I. H. P.; the *Baltimore* has room for only 17,000 square feet of heating surface in her boilers with a ratio to grate surface of less than 30, while for the *Iona* the figures are 3,160 and 75. The *Iona* works always at full power and secures a speed of about 8½ knots; for this same speed the *Baltimore* would require more power on account of the friction of the enormously larger engines. But the great economy is in the boilers. With the enormous amount of heating surface for the power developed the *Iona* can evaporate 10.5 pounds of water per pound of coal, while the *Baltimore* probably does not exceed 8 pounds. The *Baltimore's* boilers weigh 490 tons for 10,000 I. H. P., and the *Iona's* 122 tons for 700 I. H. P. Were the *Baltimore's* boilers built for economy instead of power on the same ratio as the *Iona's*, they would weigh 1,743 tons, or nearly twice as much as the entire machinery of the *Baltimore* does. The comparison was made between these two ships purposely, because they are supposed to be of best English design.

In other words, economical machinery means heavy machinery taking up much room; but the power required in swift war vessels of moderate size is so great that to make the machinery both powerful and economical the whole ship would have to be given up to it. As the great requisite in our ships is powerful but light machinery, economy must of necessity be sacrificed.

In connection with the trial trips of our vessels, it should be stated that in every case the indicators used in determining the power are carefully standardized, tables of corrections prepared, and the apparent power developed corrected for the errors of the indicators. In this way the results of all our ships are strictly comparable without the feeling of uncertainty due to differences in the types of indicator, scales or springs. So far as is known, our Navy is the only one which thus insists on rigid accuracy, and it explains the fact that the power developed by the *Yorktown*, *Concord*, and *Bennington* is apparently much less for the same speeds than foreign vessels of the same size.

Until this Bureau introduced the practice of standardizing the indicators and correcting the horse power in accordance with the errors of the instrument, it had been the custom to assume the indicator to be correct if the mean error was not very great. The rejection of indicators showing more than a moderate error, and the natural preference of contractors for those with the smallest has had a most beneficial effect on the makers of indicators, and has resulted in better workmanship and more nearly perfect instruments.

The data of the performance of the machinery of the *Newark*, the *Concord*, and the *Bennington* are given in the accompanying table:

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Full power forced draft contract trials of twin-screw steel vessels of the U. S. Navy.

1	Name of vessel		Newark		Concord		Bennington.	
2	Date of trial		December 22, 1890		January 13, 1891		April 2, 1891.	
3	Duration of trial (during which data were taken)		4 hours		4 hours		4 hours.	
4	Place of trial		At sea off Capes of Delaware Bay.		Long Island Sound		Long Island Sound.	
5	Condition of weather		Moderate breeze; moderate sea.		Moderate breeze		Fresh breeze.	
6	Length between perpendiculars, feet and inches		310′ 10″		228′ 0″		228′ 0″	
7	Beam, feet and inches		49′ 2″		36′ 0″		36′ 0″	
8	Mean draft on trial, feet and inches		18′ 3½″		14′ 0½″		14′ 0″	
9	Displacement on trial, tons		3980.		1707		1706	
10	Immersed midship section on trial, square feet		775.		436		435.6	
11	Co-efficient of fineness, prismatic		.51		.52		.52	
12	Type of engine		Horizontal; triple expansion.		Horizontal; triple expansion.		Horizontal; triple expansion.	
13	Cylinder diameters in inches.	H. P	34		22		22	
14		I. P	52		31		31	
15		L. P	76		50		50	
16	Stroke of pistons, inches		40		30		30	
17	Number and type of boilers		4 double end; 1 single end.		4 low cylindrical.		4 low cylindrical.	
18	Length and diameter of boilers		D. E. 19′ 5″x13′ 6″; S. E. 7′ 11″x8′ 10½″.		17′ 9″x9′ 9″		17′ 9″x9′ 9″.	
19	Number and diameter of furnaces in each		D. E. 6–43″; S. E 2–32″		3–37″		3–37″	
20	Total grate surface used on trial, square feet		540		220		220	
21	Total heating surface used on trial, square feet		16736.5		8210		8210	
22	Total condensing surface used on trial, square feet		12514.6		4926		4926	
23	Screw propeller	diameter, feet and inches	14′ 6″		10′ 6″		10′ 6″	
24		mean pitch on trial, feet and inches	18′ 11.7″		13′ 2.43″		13′ 8½″ and 13′ 8½″	
25		mean pitch adjustable between, feet and inches	17′ 6″ and 20′ 6″		11′ 0″ and 14′ 0″		11′ 0″ and 14′ 0″	
26		developed area, square feet	52.78		26.52		S. 24.24; P. 24.38	
27		number of blades	3		3		3	
28	Steam pressure in boilers, pounds		162		164		166	
29	Air pressure in fire rooms or air ducts, in inches of water		2.25		2.29		245	
			Starboard.	Port.	Starboard.	Port.	Starboard.	Port.
30	Steam pressure at engine, per gauge, pounds		156.1	152.6	159.9	159.6	161.41	160.69
31	Steam pressure, 1st receiver, absolute, pounds		57.4	59.7	79.5	77.0	76.76	76.53
32	Steam pressure, 2d receiver, absolute, pounds		16.8	16.6	29.0	28.5	33.11	33.23
33	Vacuum in condenser in inches of mercury		26.	25.7	24.11	24.0	24.0	23.64
34	Revolutions of main engines, per minute		127.34	126.66	151.47	153.34	150.82	151.03
35	Mean pressures, in pounds per square inch.	H. P	58.86	53.09	53.86	53.13	56.22	56.92
36		I. P	24.93	24.06	30.43	28.76	27.19	27.82
37		L. P	15.05	13.56	15.36	15.01	15.43	15.84
38		Aggregate equivalent on L. P	88.23	85.28	36.42	35.9	36.54	37.33
39		H. P	1353.49	1223.02	464.73	464.02	483.56	490.24
40		I. P	1355.20	1310.63	524.72	502.04	467.00	478.61
41		L. P	1759.66	1574.29	686.70	670.10	691.85	711.52
42		Aggregate each main engine	4408.36	4118.95	1678.15	1636.16	1642.41	1680.30

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43	Indicated horse power.	Aggregate both main engines	8582.80			8314.80			8332.80		43
44		Air pumps	29.97	31.00							44
45		Circulating pumps	15.10	15.10		27.33			19.14	17.48	45
46		Feed pumps	52.99			17.62			20.49		46
47		Blowers	117.32			34.77			45.92		47
48		Other auxiliaries	24.19			10.50			10.28		48
49		Aggregate mean of all machinery	8868.57			3404.53			3436.09		49
50		Aggregate maximum of all machinery	9131.52			3513.38			3533.41		50
51	Speed per hour, in knots		*19.00			†17.00			‡17.5		51
			Starboard.	Port.		Starboard.	Port.		Starboard.	Port.	
52	Slip of propeller, per cent		20.31	19.88		13.9	14.9		14.5	14.3	52
53	Indicated thrust of main engines only, per square foot of developed area of screw		1156.3	1070.4		1044.2	1005.6		1081.3	1100.5	53
54	I. H. P. per square foot of grate, based on mean I. H. P		16.42			15.48			15.62		54
55	Heating surface per I. H. P., based on mean I. H. P., square feet		1.89			2.41			2.39		55
56	Condensing surface per I. H. P. based on mean I. H. P., square feet		1.45			1.45			1.43		56
57	Weight of propelling machinery (including water), tons		733.98			343.01			341.10		57
58	I. H. P. per ton of machinery (mean I. H. P)		12.08			9.92			10.07		58
59	I. H. P. per ton of machinery (maximum I. H. P)		12.44			10.24			10.36		59
60	Total coal burned per hour, pounds		21590.			9402.			8923		60
61	Kind and quality of coal used		Pocahontas; semibituminous; excellent.			Pardee; anthracite; excellent.			Pardee; anthracite; excellent.		61
62	Refuse from coal, per hour, pounds		712			349.5			805		62
63	Coal per hour, per square foot of grate surface, pounds		39.98			42.74			40.56		63
64	Coal per hour, per I. H. P., pounds		2.434			2.76			2.60		64

*Patent log. †By observation, allowance being made for tide. ‡Estimated.

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In connection with these four-hour full-power contract trials it is greatly to be regretted that the exigencies of the service have prevented a systematic course of progressive speed and turning trials similar to those to which the *Chicago*, *Atlanta*, *Boston*, and *Yorktown* were subjected in 1889. The information obtained from these trials has proved of great value in calculations relative to the powering of ships and also where it has been desired to estimate the radii of action at different speeds.

It is almost impossible to get the concurrent speeds and horse powers for a series of records by observations of the daily performance at sea, as the varying circumstances of wind and weather prevent observations made at different times from being strictly comparable. The same is true of change in displacement and varying condition of bottom as regards cleanliness. There is also the fact that different kinds and qualities of coal will be used and by different men.

Systematic progressive trials over a well-established sheltered base, with the requisites of deep water and room for turning at ends of course, furnish a standard which enables a fair comparison to be made both of the same vessel at different speeds and different vessels at the same speed. They do not show and are not meant to show the exact speed which a particular power will give in every-day work at sea, but they furnish a standard of reference, from which, with the aid of the daily records at sea under varying circumstances, it will be possible to predict, with a close approximation, what can be expected of any of our ships under almost any circumstances.

It is therefore earnestly recommended that, as soon as the urgent demand for the new ships has been met, provision be made for subjecting all our ships, as opportunity offers, to systematic progressive speed and turning trials, and that sufficient time be allowed for the trial of each ship to secure thorough accuracy; by so doing we shall within a few years be in possession of reliable information in regard to the performance of our vessels, which will enable a ready and trustworthy response to be made when it is desired to know what can be expected of them under particular circumstances.

STEEL CASTINGS.

I am again obliged to report that we are having most discouraging experience with steel castings, and that the statements in former reports concerning them can be repeated almost without change, for in some cases parts designed of cast steel have been "built up" of forged or rolled steel; in others the castings have been reinforced with plates of rolled steel; and in still others the castings have been made abnormally heavy and reduced to size in the shaper or planing machine.

The publication of these reports has evidently directed considerable attention to this matter and has elicited letters to the technical press from representatives of several of the steel-casting establishments. Without exception they admit that there have been many failures and delays, but they endeavor to escape the charge of poor work for the Government by stating that they have done better for other parties and by claiming that the designs for machinery call for shapes that cannot be successfully cast in steel; they also imply that if the steel makers were allowed to modify designs and split one casting up into as many as they chose they could guarantee good work. One writer goes so far as to state that they do not claim any reduction of weight from the substitution of steel for iron, but that the parts will be so much stronger that there will be much less danger of a breakdown.

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Whatever truth there may be in the charge that some designers ask for shapes that can not be cast successfully in steel, it does not apply to the designs for the machinery of our new ships; for, without exception, the steel-makers have been met in friendly spirit by the Bureau, and every change which they have suggested within reason has been allowed. But there must, of course, be a limit to this; we do not design machinery for amusement nor to ascertain if steel-makers can cast the parts, but to answer certain very definite purposes. If cast steel will fill the requirements better than any other metal we desire to use it; but if we are to be hampered by being limited to a few shapes, and having pieces which would be one easy casting in iron cut up into a number, involving expensive machine work to fit together, and the uncertainty of bolted joints in the very places where simplicity and solidity are most needed, then the conclusion can not be avoided that steel castings are not desirable for such purposes.

It is interesting to compare the attitude now taken by the steel-makers with that assumed by them some seven or eight years since, when the first of our new vessels were building. They claimed then that they could cast anything in steel that could be cast in iron, and the Advisory Board (which was then responsible for the general designs of the ships and machinery) was criticised for its unwillingness to accept these statements without question, and use steel castings for all parts of machinery. When it was found that a fair degree of success had been attained in steel casting, they were taken at their word and given opportunity to show their capacity, and now they claim that the shapes called for (which are neither intricate nor new) can not be cast.

It can not be too plainly stated nor too strongly emphasized that the only reason for using cast steel instead of cast iron is that advantage may be taken of its greater strength to reduce weights. There can be no greater absurdity than to make steel castings of the same size as those of cast iron with a view to greater safety if the strength of the iron casting is ample; steel castings cost four or five times as much as iron ones, and it would be a deliberate waste of public money to use material in this way. The same is true of the plan of making pieces of several parts bolted together.

The little progress made in the production of steel castings was proved in a marked degree with the engine columns of a certain ship. These were perfectly plain hollow columns, and in cast iron would have been the simplest kind of work; in cast steel every one was so imperfect that they could not be used. After the failure of these columns the steel makers claimed that they were of a shape impossible to cast in steel, but before the castings were found defective not one of the makers thought there would be the least trouble in making them.

I am loath to believe that we shall be obliged to permanently abandon steel castings, for if the processes of manufacture can be improved so that absolute reliance can be placed on the product, the question of light machinery for war vessels is rendered much easier of solution. Moreover, it has always been found possible in other promising lines of work to ascertain the causes of first failures and to remedy them, and I am inclined to believe that in time this will be done for steel castings, since one firm has already successfully produced forms that the other makers said could not be cast, and their manager has stated that it is simply a question of time and the education of superintendents and workmen before we can safely count on the production in cast steel of any form now made in cast iron.

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MACHINERY UNDER CONSTRUCTION FOR NEW VESSELS.

The state of work on the machinery of the vessels reported upon in my last annual report is as follows:

Newark.—Machinery completed and successfully tried; vessel delivered to the Government, and is now in commission.

The following changes, in addition to those enumerated in my last annual report, have been made by direction of this Bureau:

Zinc protecting plates fitted in boilers.
An evaporator provided.
Indicator attachments altered to connect cylinder ends.

The following change was recommended by the contractors and approved by the Bureau:

A separate system of steam piping provided for the dynamo engines.

Concord.—Machinery completed and successfully tried; vessel delivered to the Government, and is now in commission.

The following change, in addition to those enumerated in my last annual report, was proposed by the contractors and approved by this Bureau:

Supplementary feed pump provided.

Bennington.—Machinery completed and successfully tried; vessel delivered to the Government, and is now in commission.

Maine.—The details of the propelling engines for this vessel are practically completed, and the engines have been assembled in the shops of the contractors. A public exhibition of the operation of these engines was given by the contractors at their works the 31st of August last, the power for working them being furnished from their turning engines; this operation of the engines gave the opportunity for carefully inspecting the movements of all the working details, which were found throughout to be highly satisfactory. The contractors will soon begin the work of erecting the engines on board the vessel. Work on the main steam and exhaust piping and on other copper piping for pump service is well advanced, but not yet completed. Work is progressing rapidly, and is nearing completion on all the boilers. Most of the duplicate pieces of machinery required by the contract are completed.

The engine-room pumps, both air and circulating pumps, the thrust bearings and thrust shafts are in place on board the vessel, and the starboard condenser is now being placed in position on board. The main and auxiliary feed pumps, steam winches, ash hoisting engines, and the hydraulic pumps for the turret machinery are in store at the Brooklyn navy-yard ready to be placed on board when conditions will permit. The blowing engines and distilling plant are practically completed at the works of the makers, and are ready for shipment when needed.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Combined air and circulating pumps substituted for the independent horizontal air pumps and centrifugal circulating pumps specified.
Duplicate coils furnished with evaporators to be made of iron instead of copper pipe.
Lagging on bottom of cylinders to be sheathed with sheet steel instead of with black walnut strips, as specified.
Details of oiling gear modified.

Texas.—All steam cylinders, with their liners, valve chests, and liners have been cast, bored, and are mostly fitted; piston valves and main pistons, with their details, are finished, or nearly so; eccentric sheaves and rods and the details of valve gear in general, about 75 per cent completed; all forgings for connecting rods have been received and the work of machining them is well advanced; the thrust blocks are cast and finished; seven sections of shafting have been received and are partly machined; one condenser nearly finished and the other well advanced; main injection valves, bilge-injection valves, engine stop and throttle valves, and numerous other

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smaller valves are finished; the main boiler-stop valves are 90 per cent finished; auxiliary machinery, such as turning engines, reversing engines, ventilating and blower engines, are nearly finished; at the Norfolk navy-yard work is progressing in boring the propeller shaft struts and stern tubes.

All the steel castings for engine bed plates and columns have been received from the Solid Steel Company, of Alliance, Ohio, and are nearly all machined; erecting foundations for the engines have been prepared in the shops and the bed plates and columns for the starboard engines are secured in place, and the high-pressure cylinder is being secured in place; the bed plates for the port engine are in position and the columns are being set up.

In January of this year work on the boilers of the *Texas* was brought to a standstill by the destruction of the contractors' boiler shops by fire, which also so damaged the finished work and boiler material on hand as to make nearly all of it worthless; new shops and tools have been procured, and after a delay of about eight months the contractors have resumed work on the boilers, being now drilling, flanging, and fitting material recently received.

Since my last annual report the following changes in machinery have been proposed by the contractors and approved by the Bureau:

Location and dimensions of steam valves and steam ports of air-pump engines slightly modified.

Cylinders raised one-fourth inch and connecting and eccentric rods lenghtened accordingly to avoid excessive planing on feet of columns.

An additional stop valve provided in main steam pipe at division bulkhead, arranged to be operated from either engine room.

The high and intermediate pressure piston valves to be made treble ported instead of double ported.

Monterey.—The propelling engines for this vessel are practically completed; the port engine has been erected in the shop to admit of the fitting and adjustment of valves and other moving parts, and is now being assembled in place on board the vessel, the bed plates, columns, cylinders, and nearly all the working mechanism being already in place. The air pumps, circulating pumps, blowers, fire and bilge pumps, tank pumps, engine room auxiliary pumps, and both condensers are secured in place; the starboard engine has been erected in the shop and is now having the moving parts adjusted; the main and other steam piping is well advanced toward completion. The Ward coil boilers were shipped from the contractor's works at Charleston, W. Va., in February last, and are now secured in place on board the vessel, undergoing the required steam tests, the smokepipe having been temporarily erected for this purpose; the two Scotch boilers are secured in place on board.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Boiler manhole plates to be made of wrought steel instead of cast steel.

Two blowers to be provided in each fire room instead of one, as specified.

A light service tank pump to be provided for each engine room.

Eccentric straps of main engines to be lined with white metal.

Details of boiler seatings slightly changed.

L. P. cylinder heads strengthened by additional ribbing.

Section of line shafting next abaft crank shafts made 5 inches shorter than designed on account of the section coming next having been forged 5 inches too long.

Smoke pipe casing slightly increased in thickness.

Hand rails and stanchions made of polished steel instead of brass.

Feed pipe flanges to be brazed instead of screwed on.

Alterations made in details of distilling plant.

Air accumulators provided for hydraulic pumps.

In addition to these changes pressure-reducing valves (four in all) have been supplied for use in the steam piping between the Ward and Scotch boilers, this having been done by direction of the Bureau.

Gunboat No. 5.—Excellent progress has been made by the contractors on the engines for this vessel. All cylinders, with the liners, heads, valve chests, and liners, have been cast and the work of machining them is almost completed. With the exception of three sections all the steel castings for bed plates have been received and are partly machined. One bed plate has been fitted together and its crank-shaft journals are now being bored as the last step before the engine can be assembled. The auxiliary machinery, such as air-pump engines, turning engines, reversing engines, etc., is all well advanced; the main condensers are finished and auxiliary condensers about 75 per cent finished; work on main steam and exhaust pipes, stop valves, check and

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blow valves, and similar details is well in hand; line shafting about 75 per cent completed. Much work has been done on the boilers, but they are not so far along as the engines on account of delays that the contractors have experienced in getting material for them.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Two-cylinder simple engines substituted for compound engines for driving the air pumps.

Bannister patent rocking grates to be used in place of the wrought iron revolving or shaking grates specified.

Position of main safety valves changed.

Details of sea and bilge injection connections modified.

Gunboat No. 6.—Same in all general respects as regards progress of work as above given for Gunboat No. 5. The same changes in machinery have been proposed by the contractors and approved by the Bureau as enumerated in the case of Gunboat No. 5.

Cruiser No. 9.—All cylinders for main engines are finished and ready for testing; the piston valves and their details are all practically finished; pistons, piston rods, stuffing boxes, and connecting rods are far advanced towards completion; eccentrics, eccentric straps and rods, valve stem crossheads, links, and other details of valve gear well advanced; forgings for all crank, line, thrust, and propeller shafts have been received, and have been partly machined; the sections of starboard bed plate have been planed, drilled, and fitted together and set in place in the erecting shop with the main bearing brasses and caps fitted; some of the V-frames have been erected on this plate, and the engine is being assembled as fast as possible; castings for the bed plate of the port engine have been received and are partially machined; the condensers are well in hand; good progress has been made on engines for air and circulating pumps and other auxiliary machinery; main injection and delivery valves are finished, and many of the smaller sea valves are finished, some of the latter being in place in the ship. All material for boilers has been received; three of the main boilers are finished except fitting tubes, and the two auxiliary boilers are nearly finished, one of them being tubed; the main and auxiliary steam and exhaust pipes and much of the smaller piping is completed as far as can be done until the boilers are placed in the vessel.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Piston valves adopted for circulating pump engines.

Caps on upper high and intermediate valve chest bonnets to be made of cast iron instead of cast steel.

Stern tubes to be made in two pieces on account of difficulty experienced in getting single castings.

Simple two-cylinder engines to be used for driving the air pumps in place of compound engines specified.

One double engine to be used for turning the main engines instead of a separate turning engine for each main engine.

Shape of main injection strainer altered to suit space for it between framing of vessel.

Domes of separators to be made of composition instead of cast steel.

Propellers to be three-bladed instead of four-bladed.

Air pump engine frames to be made of cast iron instead of cast steel.

Position of separators to be altered on account of their interfering with doors between engine and fire rooms.

Details of water service to crank-shaft bearings altered.

Steam heating provided for pilot house.

Uptakes to be made of steel instead of sheet iron.

Alterations made in details of overboard discharges of traps and heaters.

Kirkwood's shaking grates adopted.

Form of condenser tube packing gland changed slightly.

Design of main throttle valves changed.

Wrought-iron pipe coils to be used in the evaporators of the distillers in place of copper pipes specified.

In addition to these changes, a connection has been made between the fire main and the distiller, this having been done by direction of the Bureau.

Cruiser No. 10.—The main cylinders are finished, with the exception of one, which has some drilling for flanges yet to be done. Work on the cast-steel bed plates and

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Y frames well advanced, but not as much so as in the case of Cruiser No. 9; three of the four main boilers are finished, and the fourth one is finished with the exception of tubing; one of the auxiliary boilers is finished and the other one nearly so. In all other respects the condition of machinery for this vessel is practically the same as given above in the case of Cruiser No. 9, these two vessels being built by the same contractor.

I would state here that the contractor for these two vessels has made numerous complaints of delays suffered by him on account of the non-delivery of steel castings within the time agreed upon by the steel makers.

The same changes have been authorized for the machinery of Cruiser No. 10 as are enumerated above for Cruiser No. 9.

Cruiser No. 11.—All the main cylinders, valve chests, piston valves, stuffing boxes, valve stems and crossheads, links, link blocks, eccentrics and rods for same, suspension links, and numerous other details connected with main engines are now finished as far as they can be until incorporated in the general structure of the machinery; bedplates are completed; screw propellers and propeller shafts, stern tube stuffing boxes, main condensers, reversing engines, turning engines, and starting gear are all completed; some work remains to be done on the wrought steel, built-up engine frames, which when completed will admit of the engines being erected in the shops for final fitting and adjustment of the various parts. All material for boilers has been delivered, and the work of drilling, planing, bending, and flanging same is nearly completed; the furnaces and combustion chambers for the single-ended boilers are finished, ready to be put in place in the boilers, and three furnaces and combustion chambers for double-ended boilers are finished; the shell of one single-ended boiler is bolted together ready for riveting; main stop valves, safety, feed, blow, and other valves for boiler fittings are well advanced in manufacture.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Slight change made in details of construction of the condensers.
Built-up, wrought steel "Y" frames for the main engines substituted for the cast-steel frames specified, to avoid delay and possible failure in getting the steel castings.
Frames for engines of air and circulating pumps to be of forged steel instead of cast steel.
Stern-tube-bearing supporting-rings to be made of cast iron instead of cast steel.

Cruiser No. 6.—All cylinders, liners for same and for valve chests are cast and are 80 per cent finished; all piston valves are practically finished; five of the six main pistons are nearly finished; work is well advanced on piston rods, cylinder covers, valve chest bonnets, and similar details; eccentric rods and straps, valve stems with guides and crossheads for same, links, link blocks, suspension links, and other details of valve gear, about 60 per cent finished; iron forgings for main engine "Y" frames are delivered and are machined; some of the wrought steel front columns for engines have been received and are being machined; the bedplates for main engines (manganese bronze) have been cast and are about 80 per cent machined; main air pumps, circulating pump engines, main and auxiliary feed pumps, and fire-room blowers are finished; reversing engines, circulating pumps, ash hoists, and other auxiliary machinery, well in hand; main condensers about 60 per cent finished. The plates for the four double-ended boilers are all drilled; all back connections have furnaces riveted in and are ready to go in place in boilers; one boiler has back connections in place and both heads in; three of the boilers have one head in and all shell riveting finished; the fourth boiler is partly riveted; all tube sheets are drilled and fitted; the back connections for the single-ended boilers are fitted together for drilling and about one-half the drilling done; six of the back connections and furnaces are fitted together ready for riveting; all tube sheets are drilled; all shell sheets for one of these boilers are rolled and the front head fitted in place.

Since my last annual report the following changes to machinery have been proposed by the contractors and approved by the Bureau:

Main eccentric straps lined with white metal.
Valve stem guides made of cast iron instead of cast steel.
Details of connections of eccentric rods modified.
Valve stem crossheads to be made of forged steel instead of cast steel as specified.
Main throttle valves to be operated by hand gear instead of by steam.

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Capacity of main air pumps increased.
The front (cylindrical) engine columns to be made of wrought steel instead of cast steel.
Cylinder heads and valve chest covers for main engines to be made of cast iron instead of cast steel.
The "Y" frames for back of main engines to be iron forgings instead of steel castings.
Details of construction of condensers slightly modified.
Corliss valve substituted for piston valve as the steam valves of the reversing engines.
Details of boiler seatings slightly modified.
Crosshead for main engines to be made of forged steel instead of cast steel, and crosshead slippers to be of phosphor bronze instead of cast steel.
Bedplates for main engines to be made of manganese bronze instead of cast steel.

New York.—All of the chief parts of the main engines, such as cylinders with their liners and covers, valve-chest liners and covers, bedplates, "Y" frames, etc., are cast and much of the machine work is completed, other machine work being in progress, and work of assembling the two after engines is now going forward in the shops. Details of pistons and rods, connecting rods, crossheads, eccentrics, valve rods, and other working parts about engines are well advanced toward completion; turning engines, reversing engines, circulating pumps and engines for same, sentinel valves, auxiliary stop valves, sea valves, and numerous other details are completed; some of the sea valves and piping for same are in place in the vessels; main condensers are well advanced toward completion. All material for boilers has been delivered; twenty-six combubustion chambers are wholly riveted and calked and the remaining two are ready for riveting; all shell plates are planed, drilled, and bent; the shells of five of the double-ended boilers are partially assembled and partially riveted; the combustion chambers and furnace flues are in place within four shells and are being riveted and stayed; the uptakes are being assembled; forty-eight furnace fronts are assembled; girder and bar braces, manhole plates, furnace doors, and other details of the boilers are well advanced. In general I can say that remarkably rapid progress has been made on this machinery during the past year.

The following changes, in addition to those enumerated in my last annual report, have been proposed by the contractors and approved by the Bureau:

Valve stem crossheads to be made of manganese bronze instead of cast steel.
Suspension rod block to be of forged instead of cast steel.
Eccentric straps to be lined with white metal.
Outboard section of propeller shaft to be increased in diameter by one-quarter inch.
Eccentric rods lengthened to agree with alteration in valve stem crossheads.
Air pumps of Blake pattern to be used instead of the single acting vertical air pumps specified.
A group of four 4-inch safety valves to be used instead of the two 7-inch valves specified for each main boiler.
A combined piston and butterfly throttle valve substituted for the gridiron type of throttle valve specified.
Details of construction of main condensers slightly modified,
The Cramp steam reversing gear adopted in place of the reversing engine originally intended.
The "Y" frames to be made of cast gun iron instead of cast steel.
Alteration made in details of main injection valves.
Stuffing box for auxiliary injection pipe on inner skin of ship to be omitted.
Exhaust pipes between valve chests to be of composition instead of copper.
Height of smoke pipes above grates increased nine feet. (There are three smoke pipes instead of two, as specified, the change in number having resulted from the change in dimensions and arrangement of boilers, made at the time the contract was signed.)
Auxiliary condensers to be of the Wheeler type.

Steel practice vessel.—Many of the principal parts of the main engines are completed, or nearly so; bedplates for one engine are machined and bolted together; H. P. and I. P. cylinders, with their liners and valve-chest liners, are assembled; front and back columns and frames for engines are rough machined and are now being finished; connecting rods all rough turned and planed ready to receive brasses; main-bearing bottom brasses completed and cap brasses for same nearly so; eccentrics and rods, valve stems, link bars, and other details of valve motion well advanced toward comple-

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tion; patterns completed for main condensers and details for same, outboard delivery valves, main and bilge injection valves, stern-tube stuffing boxes, etc. The boilers are being built by subcontract at the Lake Erie Boiler Works, Buffalo, N. Y., where considerable delay has been experienced on account of failure on the part of the steel makers to deliver material promptly; all the material is now on hand, however, and has been flanged, drilled, and shaped. All the front heads are riveted together and considerable riveting has been done on the longitudinal shell seams, the work in general being now progressing satisfactorily.

The following changes have been proposed by the contractors and authorized by the Bureau:

Material for "A" braces on engine frames changed from forged steel to wrought iron.

Location of lap joints in front sheets of boiler changed.

Boiler tubes to be made of No. 13, B. W. G., instead of No. 14 in thickness.

Eccentric straps to be made of phosphor bronze instead of composition as specified.

The condition of work on machinery being built at navy-yards for new vessels is as follows:

Monadnock.—Machinery building at the navy-yard, Mare Island, Cal. Both engines are lined up on the erecting floor in the shops, with bedplates, cylinders, cylinder and valve-chest covers, connecting rods, etc., finished and in place; eccentrics, eccentric straps and rods, valve stems, and other details of valve motion practically finished and ready for assembling; a number of small details about the engines, such as cylinder drain cocks and relief valves, nuts for tie rods, reversing shaft-brackets, crosshead slides, etc., are not yet completed, but are nearly so; crank and line shafting completed except drilling flanges and fitting coupling bolts; the condensers are finished and tested; reversing engines are nearly finished; air pumps and engines for same are well advanced; the main steam piping is practically finished except fitting flanges; patterns for main injection and outboard delivery valves finished. The boilers are completed and are set up on timbers in the relative position they will occupy on the ship. The uptakes, dry pipes, and a few other boiler fittings are finished, but not attached to the boilers. The fire tools for outfit and stores are ready to go aboard the ship.

Cruiser No. 7.—Machinery building at the navy-yard, New York. Bedplates, columns, and cylinders for one engine are completed and assembled; the bedplates and columns for the other engine are completed and the columns are in place, the cylinders being now ready to go in place; cylinder covers are finished and valve-chest covers nearly so; eccentrics and straps, links, valve-stem crossheads and other details of valve gear well advanced; piston rods are eight-tenths finished and connecting rods six-tenths finished; the turning engines are completed and the reversing engines, air-pump engines and condensers nearly completed; work on the main steam and exhaust pipes well in hand; many minor details about engines are completed. Work of constructing the boilers has been considerably delayed on account of failure on the part of the steel-makers to deliver material promptly; nearly all the material is now on hand and is being rapidly worked into shape; several combustion chambers are finished or nearly so, and the work of flanging and drilling back tube sheets and planing and drilling shell sheets is well in hand; all braces, socket bolts, tee and angle irons are finished; the main and auxiliary boiler stop valves, feed-check, bottom and surface blow valves and blow-off valves are finished.

The following changes, in addition to those enumerated in my last annual report, have been authorized by the Bureau:

Form of brackets for supporting turning gear altered and details of turning gear modified to correspond.

End sections of condenser shells to be made of cast brass instead of rolled brass.

Hydrostatic pressure for testing cylinders established at 210 pounds for H. P. cylinder, 150 pounds for I. P. cylinder, and 95 pounds for L. P. cylinder instead of 250, 180, and 100, respectively, as specified.

Cruiser No. 8.—The work of machining the bed plates, engine columns, and cylinders is practically completed, and these important parts of the engines are about to be assembled; in all other respects the machinery is in the same state of advance-

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ment as stated above for cruiser No. 7, the engines for the two vessels being made from the same drawings and patterns, and the work of making the various parts is carried on simultaneously without regard to which vessel the parts will eventually belong.

The same changes have been authorized in the machinery as are enumerated above for cruiser No. 7.

The condition of work on the machinery of vessels contracted for during the past year is as follows:

Cruiser No. 12.—This vessel, hull and machinery complete, is being built by William Cramp & Sons, Philadelphia, Pa., under contract dated November 19, 1890, to be completed May 19, 1893.

One hundred sheets of drawings of machinery completed; three cylinders of main engines, with their liners and valve-chest liners are cast and partly machined; all piston rods are on hand and are nearly finished; six castings for pistons received and partly machined; all parts for thrust and steady bearings on hand and about one-half machined; work on condensers is well under way; patterns for the centrifugal circulating pumps and their engines are nearly completed; the turning engines are in course of construction; many of the details of engines, such as brasses for main bearings and connecting rods, crosshead slippers and guides, cylinder covers, piston followers, eccentric rods, and straps are now well in hand. The most of the material—shell and fire-box sheets, furnaces, tubes, etc.—for the main and auxiliary boilers has been delivered and considerable of the work of planing, drilling, and shaping this material ready for assembling has been done. In general, about one-fifth of the work on the machinery of this vessel has been done.

The following changes have been proposed by the contractors and approved by the Bureau:

The six after main boilers to be 15 feet 9 inches diameter and 18 feet long, instead of 15 feet 6 inches diameter and 21 feet 3 inches long.

The two forward main boilers to be 15 feet 3 inches diameter and 18 feet long, instead of 11 feet 8 inches diameter and 18 feet 8½ inches long; these two boilers also to be fitted with four furnaces in each end instead of two furnaces in each end.

Crossheads to be made of forged steel instead of wrought steel.

Shells of auxiliary boilers to be made of one instead of two courses.

Thrust bearings of horseshoe type adopted.

Details of crosshead ends of connecting rods modified.

Cylinder heads to be made of cast iron, instead of cast steel as specified.

Shape of bedplates slightly modified.

Condenser shells to be made of cast instead of sheet brass, and slight modifications made in details of construction of the condensers.

Piston valves for the I. P. and L. P. cylinders to be made of cast iron instead of composition, and the valves for H. P. cylinders modified to admit steam to cylinders from middle instead of ends.

Slight alterations made in details of castings for cylinders, to facilitate lagging, etc.

Relief valves of the ordinary type to be fitted to cylinders in place of the spring relief valves specified.

Location of thrust bearing of amidship shaft altered, and disk couplings substituted for clutch couplings.

Balance piston for H. P. valves to be 7¼ inches diameter, instead of 5¼ inches.

Valve stem crossheads to be made of manganese bronze instead of cast steel.

Turning engines to be fitted with slide valves instead of piston valves, and with link motion instead of a change valve for reversing.

Slight alteration made in length of eccentric rods.

Friction bands provided for propeller shafts.

Diameter of steam cylinders of main and auxiliary feed pumps increased from 10 to 12 inches.

A combined piston and butterfly valve adopted for main throttle valves in place of gridiron valve specified.

A group of four 4-inch safety valves adopted for the two 4-inch double valves specified for each main boiler.

The auxiliary condenser specified for the after (middle) engine room to be omitted and the capacities of the auxiliary condensers in the other two engine rooms increased accordingly, the auxiliary condensers adopted to be of the Wheeler type.

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Main eccentric straps to be lined with white metal.
Separators to be made of composition instead of cast steel, and not to be of the centrifugal type.
Slight modifications made in details of reversing gear.
Starting valves on main cylinders to be omitted.

Coast line battle ship No. 1 (Indiana).—Building at the works of William Cramp & Sons, Philadelphia. Fifty-two sheets of drawings of details of machinery are completed, and the patterns, forgings, and castings pertaining to these drawings have been made or are being made. Considerable machine work has been done on details of the machinery, and some of the minor details are completed ready for incorporation. All of the angle and tee bars for boilers have been received, and some plate material for all the boilers has been received, as have been also some of the corrugated furnaces. Work of flanging and drilling material for the auxiliary boilers is in progress, and the combustion chambers and furnaces for these boilers are partially assembled.

The following changes in machinery have been proposed by the contractors and authorized by the Bureau:

Thrust bearings to be of the horseshoe type.
Piston rods increased from 6¾ to 7 inches diameter.
Eccentric straps slightly increased in width, and provision made for lining them with white metal.
Valve-stem crossheads to be made of manganese bronze instead of cast steel.
Modification made in details of crank-shaft journals.
The curved upper sheets of boiler fronts dispensed with and the fronts of boilers made flat instead.
Width of main piston rings slightly increased, and the depth of piston castings and length of cylinder casings increased to allow of this modification.
Cylinder relief valves of the usual commercial form, as made by the contractors, adopted.
"Y" frames for main engines to be made in two pieces instead of single castings.
Suspension-rod blocks to be made of forged steel instead of cast steel.
Hydraulic controlling cylinder to be omitted from the reversing gear and slight modifications made in operating mechanism of the reversing gear.
Turning engines to be fitted with slide valves instead of piston vales.
Auxiliary condensers to be of the type known as Wheeler's.
Shells of the main condensers to be made of composition castings instead of sheet brass, and some minor changes made in details of construction of the condensers.

Coast line battle ship No. 2 (Massachusetts).—Building at the works of William Cramp & Sons, Philadelphia. The machinery for this vessel is the same as for the *Indiana*, and the same amount of progress has been made as stated above for the latter vessel, the work of building the machinery for the two vessels going on simultaneously from the same drawings and patterns.

The same changes in machinery have been authorized by the Bureau as are enumerated above for the *Indiana*.

Coast line battle ship No. 3 (Oregon).—Building at the Union Iron Works, San Francisco, Cal. Thirty-three sheets of drawings have been prepared; patterns for bedplates, thrust blocks, cylinder linings, and numerous smaller details are finished or in hand; balance pistons for main valves completed; all followers for piston valves are finished; one H. P. and one I. P. piston are finished; many of the details, such as reversing-shaft arms and brackets, cylinder relief valves, piston-rod nuts, valve stems, piston valves, eccentric straps, link blocks, etc., are well in hand; the circulating pump engines are finished; fire-room blowers and their engines are nearly finished; other auxiliary machinery, as ash hoists and turning engines, well advanced. Considerable material for boilers has been received, and the work of machining and shaping it is about to begin.

The following changes in machinery have been proposed by the contractors and authorized by the Bureau:

Distance between centers of main cylinders increased 1 inch.
Relief valves for cylinders and steam chests made of uniform size.
Valve-stem crossheads to be made of forged steel instead of cast steel.
Arrangement of throttle valves and starting gear modified.
Slight changes made in details of reversing gear.
"Y" frames for main engines to be made of forged iron, and cylindrical columns to be of forged steel instead of cast steel.
Eccentric straps to be lined with white metal.

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Caps for main bearings to be made of bronze instead of cast steel.
Main crossheads to be of forged instead of cast steel.
Horseshoe type of thrust bearing adopted.
Bedplates for main engines to be made of manganese bronze instead of cast steel.
Slight modifications made in details of filters for feed water.
Location of auxiliary boilers changed on account of the hull of the ship having been lengthened.
Location of distilling plant changed.
Auxiliary boilers to be provided with the closed ash-pit system of forced draft.
Manner of securing boilers to hull modified.
Each double-ended boiler to be provided with three 4½-inch safety valves instead of four 3½-inch valves, as specified.
Dimensions of feed-check valves reduced slightly.
Two small tank pumps to be supplied in addition to the pumping outfit required by specifications.
Details of construction of separators modified.
Shells of main condensers to be made of cast composition and minor changes made in details of condensers.
Stroke of air pumps increased from 18 to 20 inches.
A mortise wheel with wooden teeth and bronze pinion substituted for cast-steel gear wheel and rawhide pinion in operating mechanism of the air pumps.

Harbor Defense Ram No. 1.—Building at the Bath Iron Works, Bath, Me., under contract dated January 28, 1891; to be completed eighteen months from date of contract. Much of the preliminary work of preparing detailed drawings of machinery is completed or well advanced. Patterns for the high and intermediate pressure cylinders are completed; also patterns for connecting rod brasses, crossheads and guides for same. Some machine work has been done on detailed parts of machinery and some details are completed ready for incorporation. Two sections of the cast gun-iron bedplates for main engines have been delivered. Four tube sheets for the main condensers are nearly completed, and end sections for condenser shells are in process of manufacture. About 1,000 screw glands for condensers are finished. No boiler material has yet been delivered.

The following changes in machinery have been proposed by the contrcators and approved by the Bureau:

Bedplates for main engines to made of gun iron instead of caststeel.
Three double-ended Scotch boilers substituted for the four straight-through boilers specified, and the arrangement of the boiler rooms, fire rooms, etc., altered accordingly.
Steam passages enlarged, location of relief valves changed, and other slight modifications made in details of cylinder casings.
Condenser shells to be made of composition castings instead of sheet brass.

Cruiser No. 13.—To be built by the Wm. Cramp & Sons' Ship and Engine Building Company, of Philadelphia, Pa., under contract dated August 31, 1891. No work relating to the machinery for this vessel has yet been done. As this machinery is the same as provided for Cruiser No. 12, building at the same shipyard, much of the preliminary work of preparing drawings and patterns reported above as having been done for the latter vessel will be applicable to Cruiser No. 13, so it can be said that considerable progress has already been made with this preliminary work.

Steam Tug No. 1.—Building at the works of Harrison Loring, Boston, Mass. All cylinders and covers for same, pistons, piston rods, crossheads, guides, connecting rods, valves and stems, links, eccentrics and details of valve gear, crank shaft, line shaft, engine columns, thrust rings, and various lesser details of the machinery are completed and ready for assembling; the condenser is nearly completed; the propeller shaft is finished but not yet fitted to propeller; the line-shaft-bearing and thrust-block bed-plates are being machined; all forgings for reversing mechanism are in the shop ready for machining and fitting. Connection of boiler ready for fitting to furnaces; boiler heads are ready for drilling flanges; the shell of the boiler is ready for riveting.

The following changes have been proposed by the contractors and approved by the Bureau.

Slight alterations made in form of bedplates.
Crank pin ends of connecting rods to be fitted as stub ends instead of with gib and key.
Boiler shells to be made of three sheets for each course instead of two sheets.
Stub ends substituted for gib and key connections on ends of eccentric rods.

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Steam Tug No. 2—Building at the works of Harrison Loring, Boston, Mass. The bedplate, back columns, and condenser are in position in the shop ready to receive the cylinders; all pistons, piston rods, crossheads, connecting rods, valves, and stems, links, eccentrics, and details of valve motion, propeller shaft, I. P. exhaust pipe, and minor details of engine are completed and ready for assembling; work on thrust block, condenser, and reversing gear is now in progress in the shop; the stern tube is finished. All shell, head, connection, and butt strap material for boiler have been fitted and drilled and are ready for riveting.

The same changes in machinery have been authorized as are enumerated above for Steam Tug No. 1.

Steam Tug No. 3.—Building at the works of Harrison Loring, Boston, Mass. The engine is in course of erection in the shop; the bedplate, condenser, columns, cylinders, guides, crossheads, connecting rods, and crank shaft are in position; the pistons, piston rods, valves, valve stems, links, eccentrics, and details of valve gear are completed and ready for assembling; the stern tube, line shafting and propeller shafting are finished; a pattern for the screw propeller is now being made; work on the reversing gear is in progress. All material for the boiler has been fitted and drilled and the shell of the boiler is now being riveted together.

The same changes in machinery have been authorized as are enumerated above for Steam Tug No. 1.

DESIGNS OF MACHINERY FOR NEW VESSELS.

Owing to the appropriation by Congress at its last session for only a few ships, the Bureau has prepared since its last report but three sets of designs for new machinery of any size. The drafting force has, however, been kept busy in working out designs for the details of the machinery of the *Monadnock*, *Cincinnati*, and *Raleigh*, improved designs of launch engines, and repair work on vessels already in commission.

PROTECTED CRUISER NO. 13.

This vessel is practically a duplicate of Protected Cruiser No. 12, as finally contracted for, and as the same speed and horse power are required, it was considered that the machinery of that vessel would be the best design for the sister ship.

The most prominent feature of this machinery is the use of three screws. As was stated in last year's report, this is done with a double object; greater assurance of safety in the parts of the engines from being of smaller size than if twin screws were used, and of immunity against complete disablement from having three independent sets of propelling machinery instead of two; and increased economy at low speeds from the use of a single engine at nearly full power instead of two at much below full power.

It is interesting to note in this connection that when the designs of our new ships were discussed in the Institution of Naval Architects (of England) in connection with the paper of Mr. J. Harvard Biles, this point of increased economy from the use of a single engine (the other screws revolving freely) received considerable notice, and statistics were quoted from actual practice by several gentlemen to show that this was an eminently proper step in the design.

The expected sea speed is 21 knots, and the sustained horse power about 21,000, with the main engines making 129 revolutions per minute.

The cylinders of each main engine will be 42, 59, and 92 inches diameter by 42 inches stroke, the engines being of the vertical, inverted, direct-acting type, with inverted Y-columns at the back and cylindrical forged-steel columns at the front. Piston valves are fitted to all the cylinders; one for the high pressure, two for the intermediate, and four for the low pressure, those of the intermediate and low pressure cylinders being interchangeable. The valves will be worked from Stephenson double-bar links, provision being made in the attachment of the suspension rods to reversing shaft arms for independent adjustment of the point of cut-off for each cylinder. The crank shafts are in three interchangeable and reversible sections. They are of hollow forged steel.

The condensers are of composition and sheet brass. Each main condenser has 9,474 square feet of cooling surface, making the total 28,422 square feet. There are two auxiliary condensers. For each main engine there is a double, vertical, single acting air pump, worked by vertical simple engines, with exhaust to the receivers or condenser, as desired. There are two centrifugal circulating pumps for each main condenser, worked independently.

There are six double-ended boilers 15 feet 9 inches diameter and 20 feet long; two

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15 feet 3 inches diameter and 18 feet 1½ inches long for main boilers; and two single-ended auxiliary boilers 10 feet 1½ inches diameter and 8 feet 6 inches long. The double-ended boilers have each eight corrugated furnaces, those for the larger boilers being 40 inches internal diameter, and those of the smaller 39 inches; the auxiliary boilers have each two corrugated furnaces 33 inches internal diameter. The total grate surface of all boilers is 1,522.2 square feet, and the total heating surface 49,248 square feet. The forced draft will be by closed fire rooms. The working pressure is 160 pounds. The main boilers are in four water-tight compartments, and the auxiliary boilers are on the protective deck. There are two smokepipes.

The starboard and middle propellers are right handed and the port one left-handed; they will be made of manganese or other approved bronze.

Provision is made for blowers for forced draft, feed, bilge, and fire pumps; evaporators for furnishing fresh water to make up losses and for drinking purposes and distillers; refrigerating plant; steam ash-hoists; power tools and engine for workshop; and the other usual auxiliary machinery.

The contract for this vessel complete has been awarded to the William Cramp & Sons' Ship and Engine Building Company, of Philadelphia, Pa.

Portions of the machinery are shown on plates 1, 2 and 3.

TORPEDO CRUISER NO. 1.

Although for the present the construction of this vessel has been abandoned because no bids were received in response to advertisement, it is believed that a description of the machinery and drawings of some parts will prove of great interest on account of the enormous power required in such a small hull—6,000 I. H. P. in a hull displacing only 750 tons. The intended speed was 23 knots. So far as is known this is the greatest I. H. P. ever proposed for this displacement.

The following is a description of the designed machinery:

There are twin-screw, triple-expansion engines of the vertical, inverted-cylinder, direct-acting type for the main engines, fitted as rights and lefts and in a common compartment. There is one high-pressure cylinder 23½ inches diameter, one intermediate 34½ inches diameter, and two low pressures, each 38 inches diameter, the common stroke being 18 inches. The working steam pressure is 200 pounds, and the revolutions of the propelling engines 333 per minute, giving a piston speed of 1,000 feet per minute. The main valves are all of the piston type, one for the high pressure, two for the intermediate, and two for each low-pressure cylinder, all worked from Stephenson double-bar links. The valves for the high pressure and intermediate cylinders are each a single casting turned to a neat fit and without packing rings; the low-pressure valves are fitted with packing rings and followers. The point of cut-off, in full gear, is at seven-tenths of the stroke. The engine framing consists of forged steel columns, trussed by forged steel stays. The bed plates are of cast steel, supported on plate steel keelsons built in the vessel. The crank shafts form a single hollow forging.

There is only one condenser for both engines, of composition and rolled brass. The cooling surface is 8,400 square feet. There are four vertical single-acting air pumps; two worked from the low-pressure crossheads of each engine; the diameter is 19 inches and the stroke 6 inches. There are two centrifugal circulating pumps, each driven by an independent single-cylinder engine; each pump is to have a capacity of 6,000 gallons per minute.

The type and dimensions of boilers were to be selected by the contractor, with the approval of the Navy Department, but were to be coil, sectional, or tubulous. The requirements were: "Efficient means must be provided for getting at the interior of such parts of the boilers as require attention for examination, cleaning, and repair, and the tubes must be so arranged as to be readily removed, replaced, and expanded in case of leaks. All parts of the boilers must be readily accessible for cleaning and painting." Provision is made for adequate feed pumps and a feed-water heater.

The specifications include steam-reversing gear, ash hoists, ventilating fans, evaporators, distillers, and auxiliary pumps.

The weight of all machinery, boilers, auxiliaries, tools, and spare parts, including contained water, was not to exceed 255 tons.

The machinery is shown in plates 4, 5, 6, 7, and 8.

TORPEDO BOAT NO. 2.

The Department issued an advertisement last year giving the general requirements for this boat and inviting tenders from contractors on their own designs. Two bids were received on the day appointed, December 20, but there was such uncertainty as to the lowest bidder, owing to the great difference in the details of the designs, that the Department prepared designs of its own, for which new tenders were invited.

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The following is a description of the machinery:

The propelling engines will be rights and lefts, placed in a common compartment, and of the vertical, inverted, direct-acting, quadruple-expansion type; the diameters of cylinders are 11½, 16, 21½, and 30 inches, the stroke being 16 inches. The designed horse power is about 1,800 when the engines are making about 412 revolutions, or a piston speed of about 1,100 feet per minute. The working steam pressure is 250 pounds.

The high-pressure and intermediate cylinders have piston valves and the low pressure slide valves, all worked by Stephenson slotted links; the slide valves are double ported. The point of cut-off in full gear is at seventh-tenths of the stroke. The framing consists of forged steel columns trussed by forged steel stays. The engine bed plates are of plate steel, supported on plate steel keelsons built in the vessel.

There is one condenser for both engines, of composition and rolled brass, with a cooling surface of 1,379 square feet. There are two air pumps, 14 inches in diameter and 3 inches stroke, working from eccentrics on main shafts. There is one centrifugal circulating pump driven by an independent engine. This will be used at low and moderate speed. For full speed a scoop is fitted to drive the circulating water through the tubes by the motion of the boat.

There are to be two coil or tubulous boilers, each in a separate water-tight compartment.

As in the case of the torpedo cruiser, the choice of a particular make of boiler is left to the contractor, subject to the approval of the Navy Department. The requirements as to facility for overhauling and repair are the same as already given for the torpedo cruiser. The main feed pumps are driven by the main engines, and there is an auxiliary feed pump in each fire room.

Provision is made for an auxiliary air pump to drain the condenser when the main engines are not running, and for an evaporator and distiller. The ashes will be hoisted by hand.

The weight of all machinery, boilers, auxiliaries, and contained water, but exclusive of stores, spare parts, heaters, steering gear, and capstans, is not to exceed 51.75 tons.

The machinery drawings are shown in plates 9, 10, 11, 12, 13, and 14.

FERRY LAUNCH AT PORTSMOUTH NAVY-YARD.

The boat which had been performing this service for many years having finally been condemned, it was decided to build a modern engine and boiler for the new hull.

The engine is vertical and triple expansion, driving a single screw. The cylinder diameters are 6¼, 9¾, and 16 inches, and the stroke 10 inches. The intended horse power is about 100, with 300 revolutions per minute. The high-pressure and intermediate cylinders have each a plug piston valve and the low pressure a plain flat slide valve, all driven by a modified Marshall gear, arranged to give equal openings at both ends of cylinder.

The condenser is cylindrical and of composition, with about 175 square feet of cooling surface. The air pump is vertical, and worked by a lever from the low-pressure cross-head; the circulating pump is centrifugal and independent.

There is one tubulous boiler of the Towne pattern, with about 16 square feet of grate and about 577 square feet of heating surface, the working pressure is 160 pounds.

The propeller is of ordinary navy composition, four bladed, and cast as a true screw of 5 feet pitch; the diameter is 4 feet and the developed area 5.15 square feet.

The main engines cover a floor space 2 feet 5 inches by 4 feet 10½ inches, and are 4 feet 5½ inches from bottom of bed plate to top of cylinder cover. The entire machinery occupies 19 feet of the length of the boat. The machinery is shown on plates 15, 16, 17, and 18.

NOTE.—The drawings shown are photolithographic reproductions of the original drawings, and the scale has been reduced to one-half of that marked on the drawing.

THE SINGLE-TURRETED MONITORS.

In the annual report of this Bureau for 1887, attention was called to the fact that the single-turreted monitors were the only armored vessels we possessed in a state of completion. Since then the *Miantonomoh* has been practically completed and the other vessels of this class are in a more or less advanced State; still, at present, in case of sudden emergency, the single-turreted monitors are the vessels on which our main reliance would depend for harbor defense for some little time. It is true that these vessels are of antique type, slow, and unhandy; for harbor defense, however, speed is of hardly as much importance as light draft, and this they have, enabling them to take positions in shallow water where most cruisers or ironclads can not reach

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them for ramming. At close range, as in a harbor, their 15-inch smoothbore guns would probably be found effective against vessels of the cruiser class, but, if thought advisable by the Ordnance Bureau, their battery could easily be changed to one of more modern type; their turrets are sufficiently armored to afford fair protection to the guns' crews; their freeboard is so low that their sides offer but a very small target; as training or practice vessels, especially for the naval militia of the various States, they will be found of great value; and as several of them can be put in condition for service, as far as the machinery is concerned, for a moderate sum, it is respectfully recommended that it be done.

ESTIMATES.

The amount estimated as necessary to be appropriated for steam machinery for the fiscal year ending June 30, 1893, is the same as the amount appropriated for the present one, and is, in the opinion of the Bureau, the smallest sum that can with the greatest economy be made to meet the demands upon this appropriation.

It is earnestly requested that another writer be allowed at the New York navy-yard and one at the Norfolk navy-yard, as the clerical force at these stations is not at present sufficent to properly carry on the business of the Bureau.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893 by the Bureau of Steam Engineering, Navy Department.

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
STEAM MACHINERY.			
For completion, repairs, and preservation of machinery and boilers of naval vessels, including cost of new boilers, distilling, refrigerating, and auxiliary machinery; preservation of and small repairs to machinery and boilers of vessels in ordinary, receiving and training vessels; repair and care of machinery of yard tugs and launches	$450,000		
For purchase, fitting, repair and preservation of machinery and tools in navy-yards and stations, and running navy-yard engines	40,000		
For incidental expenses of naval vessels, yards and the Bureau, such as foreign postage, telegrams, advertising, freight, photographing, books, stationery, and instruments	10,000	$700,000	$700,000
For purchase, handling, and preservation of all materials and stores	200,000		
(All the above act March 2, 1891.)			
SALARIES.			
Chief clerk (act March 3, 1891)	1,800		
One clerk of class 2 (same act)	1,400		
One clerk of class 1 (same act)	1,200	6,440	
One assistant messenger (same act)	720		
Two laborers (same act)	1,320		
One chief draughtsman (same act)	2,250		
One draughtsman (same act)	1,400	4,650	
One draughtsman (same act)	1,000		
		11,090	11,090
CIVIL ESTABLISHMENT.			
Navy-yard, Portsmouth, N. H.:			
Clerk to Department, per annum (act March 2, 1891) $1,200			
One messenger (same act) 600	1,800	1,800	
Navy-yard, Brooklyn, N. Y.:			
Clerk to Department per annum (same act) $1,400			
One writer (same act) 1,000			
One messenger (same act) 600	3,000	3,000	

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Estimates of appropriations required, etc.—Continued.

Detailed objects of expenditure, and explanations.		Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
CIVIL ESTABLISHMENT—continued.				
Navy-yard, League Island, Pa.:				
Clerk to Department, per annum (same act)	$1,200	$1,200	$1,200	.....
Navy-yard, Norfolk, Va.:				
One clerk to Department, per annum (same act)	$1,300			
One messenger (same act)	600			
One writer (submitted)	1,000	2,900	2,900	.....
Navy-yard, Pensacola, Fla.:				
One writer (same act)	$1,000	1,000	1,000	.....
Navy-yard, Mare Island, Cal.:				
Clerk to Department, per annum (same act)	$1,400			
One writer (same act)	1,000			
One messenger (same act)	600	3,000	3,000	.....
		12,900	12,900	$11,900
IMPROVEMENT OF PLANT.				
Navy-yard, Norfolk:				
Extra tools required to put the yard into condition for building and repairing modern marine machinery, with economy and dispatch, including improvements in handling machinery, and in the boiler making plant (submitted)		49,205	49,205	.....
		49,205	49,205	.....
CONTINGENT.				
For contingencies, drawing materials and instruments for the drawing room (act March 2, 1891)		1,000	1,000	1,000

Very respectfully,

GEO. W. MELVILLE,
Engineer-in-Chief, U. S. Navy, Chief of Bureau.

Hon. B. F. TRACY,
Secretary of the Navy.

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APPENDIX A.

TEST OF THORNYCROFT BOILER OF U. S. S. CUSHING.

NAVY-YARD, NEW YORK, *November* 22, 1890.

SIR: The Board appointed to test one of the Thorneycroft boilers of the U. S. torpedo boat *Cushing*, under the instructions of the letter of the Bureau of Steam Engineering dated July 25, 1890, numbered 2164-KK, and of your indorsement on same, having executed all the tests required by the Bureau respectfully reports as follows:

Although August 1 was the date set by the Bureau for the beginning of the tests, it was not until the 1st of October that the vessel came into the hands of the board for the required preparations. The forward boiler was selected for the purpose, its situation in the vessel and its surroundings affording better conveniences for the work than its fellow. These boilers differ in no essential particular from other Thornycroft boilers of recent make.

A rehearsal of the pecularities here would, therefore, be superfluous, and only their general dimensions, etc., are given as follows:

Length, fore and aft	8 feet 6 inches
Width, extreme	8 feet 7 inches
Height, from bottom of ash pan to top of casing	8 feet 6 inches
Weight of boiler	9 tons
Weight of boiler, and water to steaming level	11 tons
Grate surface	38 square feet
Heating surface, external	2,451 square feet
Heating surface to grate surface	64.5 to 1

None of the operations required in the tests could be carried on within the machinery space save that of firing and feeding. Therefore all the apparatus especially provided was installed on deck. The safety valve located above the deck was removed, and its pipe which connects with the main stop valve chamber was used to discharge the steam. To the top of this pipe, which is 3½ inches in diameter, the single limb of a composition "T" was attached.

To one end of the cross piece of the "T" the safety valve was fixed; to the other a globe valve. A 4-inch copper pipe led from the globe valve directly outboard, beyond the ship's side, thence aft and downward, its lower end bent to parallelism with the water surface entering axially the large end of a wooden box 4 feet long. The ends of the box were open, 12 and 15 inches square respectively. This box firmly secured to the hull and the copper pipe, lay horizontally alongside the boat, its axis about 20 inches below the surface of the water.

Thus arranged the apparatus became a huge ejector, through which the steam passed carrying with it water enough to entirely condense it, and that absolutely without a sound. This or an equivalent device was a necessity, for the engine condenser could not be used, as it gets its full supply of refrigerating water only when the vessel is underway. Vocal communication would have been impossible had the steam escaped into the open air.

By the use of the globe valve an attendant kept the hand of a steam gauge constantly at the 250-pound mark.

The pot for the thermometer displaying the temperature of the steam was placed vertically in the "T" directly in the current of the passing steam. Sand was used for the thermometer bath, as all obtainable oils evaporated rapidly. The intruding pipe, serving steam for the calorimeter tests, passed horizontally across the diameter of the vertical limb of the "T." Along its bottom was a rectangular opening of the same area as the cross section of the pipe attached to it. This pipe extended perpendicularly upward about 6½ feet, terminating in a globe valve, to which was attached about 9 feet of rubber hose, leading to the barrel. This pipe, the "T," and the globe valve of the latter were thoroughly felted. For the alimentation of the boiler the feed pumps of the vessel were used.

They are single acting, 3 in number, actuated by cranks, the shaft of which is driven through gears by an independent engine that makes 3.2 strokes to 1 of the pumps. The air pumps belonging to this pumping device were disconnected and their communicating pipe with the condenser blanked off. Water placed in the hotwell into which these pumps discharge, showed no loss of quantity in 24 hours.

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1 This hot well was used as a feed tank. It is simply an open vessel 24 by 18 by 0 inches deep, so situated that direct view into it can be had from anywhere in its vicinity.

The feed water was drawn from the yard mains. It passed through a Worthington meter on the deck.

From it an iron pipe led directly to the feed tank, into the open top of which it discharged the water through a globe valve. An attendant easily regulated the speed of the feed pumps by signal from the fire room, and also the flow to the feed tank, maintaining a constant height of water within it, whatever the speed of the pumps.

The dial indications of the meter are in cubic feet. To obtain their equivalent in pounds, as well as to test its constancy under different rates of discharge, three tests of it were made by running through it about 1,350 pounds of water for each test in two, four, and seven minutes respectively. The mean weight of an indicated cubic foot delivered was found to be 63.25 pounds, at a temperature of 60° F. The accuracy of the meter, under the differing conditions of flow, is evinced by the fact that the greatest difference between either of the three indicated quantities, as shown by the scales, was only 1.1 per cent of the least of them.

In the tables appended hereto the weights of water given are corrections from the record for the differences between the temperatures found at 60°.

All the auxiliaries exhausted into the main condenser, a small centrifugal pump furnishing the refrigerating water. One set of air pumps drew the condensed water and vapor from the condenser. There was no connection between the hot well of these pumps and the feed system used.

The blower has a runner 34 inches in diameter. The vanes, twelve in number, are 10 by 10¼ inches and slightly curved. It has a single engine, of 4 inches diameter of cylinder and 4 inches stroke, coupled direct to the runner shaft. It discharges all around its circumference into a closed fire room. The air pressure was maintained constant by changes in the speed of revolution of the blower as required.

Two pyrometers extended downwards and across the smoke pipe, their dials showing over the top. They were sensitive to changes of temperature, their indications following the variations in the coal consumption. Beyond this their accuracy can not be vouched for.

This equipage was thoroughly efficient, and except that two days were lost in refitting the crank-pin brasses of the blower engine, there was no interference with the progress of the tests from accident or imperfection of any of its details.

The working force of the personnel engaged in the tests was taken from the fire-room recruits found on board the receiving ship. Out of them no selection could be made, for the history of none was known, and none acknowledged more than trifling experience with fires under forced draft.

Nor was it easy to instruct or direct them to any extent while below, for pantomimic communication alone was possible there. It is but just to say of them generally that they did their work cheerfully, and quite as well as could have been expected; but it is beyond question that men familiar with this work could have produced better results, at least under the higher fire-room pressures of the series.

To the extent that this has effect, the Bureau has in reserve a margin of efficiency in any future designs based upon the results herein recorded.

Three or four preliminary steamings were had to establish the routine of the work, the sufficiency of the plant, and instruct workers and observers in their several duties. These completed, the first run of record was made on the 27th of October.

During the preliminary steamings it had been found impracticable, under the inconveniencies of the situation, to follow the directions of the Bureau regarding the management of the fires previous to and at the beginning of a test. Convenience in cleaning the furnace and ash pits was not much considered in the design of the boiler. The doorways are small and near the level of the floor plate. The grates are long, and their front ends 6 inches below the lower jamb of the doors. The ash pits are shallow, and below the level of the floor plates, and the lack of fore and aft length in the fire room interferes seriously with the handling of the fire tools. Additionally, it was imperative that the refuse from the furnace should be hoisted out before fresh fires were stated. With these difficulties before it the board was unanimously of the opinion that more accurate results could be obtained by starting a test with full fires and full boiler pressure and finishing it with similar conditions; the determination of equality being made by three observers. The comparison was easy to make, since, the grates being 6 inches below the lower door jamb, the latter afforded a good datum line.

The readings of the meter were recorded by the clock at the end of every half hour. At the end of each run the water in the boiler and in the feed tank was brought to the height it had at the beginning, before the last reading of the meter. The quantity required to do this was small in every case, as special effort was made to maintain it at or near this height throughout the last hour of each run. Under the observation

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of a member of the board bags were filled with coal to a fixed net weight, always in lots of twenty. Bags to the number intended to be put on board at the next call were brought to the edge of the wharf.

The time at which they were put into the bunker and the number were recorded. The assistant engineer in the fireroom also made record of the time the last shovelful of each lot was put in the furnace. A small compartment built into the bunker received the coal, and it was easy to clear it entirely of all that fell in one dumping.

These checks on the deck tally, *i. e.*, the fire room tally, the number brought to the edge of the wharf, the number remaining of the original twenties, and the empty bags always confirmed the record. The coal entries in the accompanying tables are based on the fire room tallies.

The calorimeter tests were made at regular hourly intervals. All precautions usual in such tests were observed. The water was well agitated, the top of the barrel was covered, the hose was thoroughly heated before being turned into the barrel, and the weights and temperatures were obtained with carefulness.

Pocahontas coal was the fuel used. It burns freely, with a moderate amount of dark-brownish smoke. It cokes in the furnace, but does not swell much. Of the refuse charged in the tables a considerable portion was combustible. Nevertheless the ash was large enough to materially reduce results towards the ends of the long runs. It was brought to the yard early in October, was discharged on a rainy day, and lay without shelter, except such as an inadequate canvas covering gave it, through many rainy days previous to the commencement of the tests. Quantities weighed on the days of the first two trials lost by evaporation on exposure during a dry sunny day 3.11 per cent of their weight. That used on the other days lost nothing, the interval having been dry and pleasant. In the tables the coal account has been corrected for this condition. This moisture absorbed heat in the furnace in quantity sufficient to evaporate it and superheat it to the temperature of the chimney gases. This heat uselessly expended would have evaporated for each pound of coal burned 0.0373 pound of water from the temperature of the feed and at the boiler pressure. No corrections have been made for this loss of heat in the tables, but it should be considered in an estimate of the evaporative value of the fuel. The New York agents have furnished the following statement of an analysis of the coal.

	Per cent.
Fixed carbon	80.02
Ashes (brownish)	3.71

Ratio of fixed carbon to volatile carbon, 100 to 19.43.

Before the completion of the test under the 3 inches of air pressure the board became aware that relatively the quantity of coal being burned was small, but no effort availed to increase it. This peculiarity continued persistently through all the trials under the various conditions of air pressure. Convinced that this was due to other causes than those under our control, we have made no attempt to discover them. An effort was made after all the tests here recorded were completed to get better results with 3 inches of air pressure, but as neither of two watches of firemen improved on the record, the attempt was abandoned.

The water evaporated under 3 inches of air pressure would have produced at 20 pounds per I. H. P. per hour 563.8 H. P. Better firing would have produced better results. Just how much better it is impossible to say.

The tables appended and forming a part of this report contain the records of steamings under four different conditions of air pressure in the fire room, as follows:

On the 27th October, with a pressure sustaining one-half inch of water column.

On the 30th October, with a pressure sustaining 3 inches of water column.

On the 4th October, one with a pressure sustaining 4 inches of water column and one with assisted draft.

This last resulted from an attempt to make a run without the blower, the fire-room hatch being open. Although a brisk wind was blowing, this attempt failed. No significant quantity of coal could be burned, and the fire-room temperature ran up to 120.

The blower was then started, the hatch still being open. No increase of pressure showing by the air gauge. Seven and fifty-eight one hundredths pounds of coal per square foot of grate per hour were thus burned, with the results shown in the tables.

Immediately after this test was completed the furnaces were drawn, leaving sufficient clean burning fuel to start the fire again for the full air pressure test, which was then made.

Of the record of this test it may be said that the water column contains the only exact items of performance.

The time was obviously too short to give value to the coal record, and the inconsistencies of the computations therefrom we do not attempt to correct on the only available basis—uncertain guesses. This, then, only may be said, that under the conditions

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it shows that at 20 pounds of steam per I. H. P. per hour the steam made would have been sufficient for 668 I. H. P.

Respectfully,

CHAS. H. LORING,
Chief Engineer, U. S. Navy.
GEO. W. MAGEE,
Chief Engineer, U. S. Navy.
GEO. H. KEARNY,
P. A. Engineer, U. S. Navy.
W. N. LITTLE,
P. A. Engineer, U. S. Navy.

Rear-Admiral D. L. BRAINE, U. S. N.,
Commanding Naval Station, New York.
COMMANDANT'S OFFICE, NAVY-YARD,
New York, November 24, 1890.

Forwarded for information of Bureau of Steam Engineering.

D. L. BRAINE,
Rear-Admiral, U. S. Navy, Commandant Navy-Yard and Station.

TESTS OF THORNYCROFT BOILER OF THE U. S. S. CUSHING AT NAVY YARD, NEW YORK, OCTOBER 27 TO NOVEMBER 4, 1890.

TABLE No. 1—*Evaporative test, under air pressure equal to one-half inch of water.*

Reference number.	Time, Oct. 27.	Steam pressure by gauge at boilers.	Barometer (mercurial).	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperature, Fahr.				Air pressure.	Revolutions of blowing engines.
							Feed water, t_1	Steam by thermometer at boilers.	In uptake.	Atmosphere.		
	A. M.		*Ins.*	*Lbs.*	*Lbs.*	*Lbs.*					*Ins.*	
1	6.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	7.00	250	29.41	434.06	.....	2,909.5	58	398	.....	46	0.5	.....
3	7.30	250	29.42	434.06	.....	3,099.25	58	398	.....	46	0.5	.....
4	8.00	250	29.43	434.06	.....	2,213.75	58	398	480	47	0.5	.....
5	8.30	250	29.44	434.06	.....	4,111.25	58	398	.....	47	0.5	.....
6	9.00	250	29.44	434.06	.....	3,478.75	58	398	.....	48	0.5	.....
7	9.30	250	29.44	434.06	.....	3,415.50	58	398	.....	48	0.5	.....
8	10.00	250	29.42	434.06	.....	3,478.75	58	398	.....	50	0.5	.....
9	10.30	250	29.42	434.06	.....	5,502.75	58	398	630	50	0.5	.....
10	11.00	250	29.42	434.06	.....	4,427.50	58	398	.....	52	0.5	.....
11	11.30	250	29.42	434.06	.....	4,301.00	58	398	.....	52	0.5	560
12	12.00	250	29.42	552.57	.....	4,743.75	58	398	600	54	0.5	.....
	P. M.											
13	12.30	250	29.42	434.06	.....	3,858.25	59	398	.....	54	0.5	.....
14	1.00	250	29.41	434.06	.....	3,984.75	59	398	.....	53	0.5	.....
15	1.30	250	29.41	434.06	.....	4,174.50	59	398	690	53	0.5	620
16	2.00	250	29.41	542.58	.....	4,301.00	59	398	.....	54	0.5	.....
17	2.30	250	29.42	542.57	.....	3,478.75	59	398	.....	54	0.5	.....
18	3.00	250	29.42	651.09	.....	3,225.75	59	398	560	53	0.5	.....
19	3.30	250	29.43	542.57	.....	3,668.50	59	398	.....	53	0.5	.....
20	4.00	250	29.44	434.06	.....	3,921.50	59	398	.....	51	0.5	.....
21	4.30	250	29.45	434.06	.....	3,605.25	59	398	.....	51	0.5	.....
22	5.00	250	29.46	434.06	.....	3,478.75	59	398	610	52	0.5	.....
23	5.30	250	29.47	434.06	.....	3,668.50	59	398	.....	52	0.5	.....
24	6.00	250	29.48	325.54	.....	2,530.00	59	398	.....	50	0.5	.....
				10,525.94	846	85,577.25	58.5	398	*595	50.9		590

*536.5 See appended sheet of corrections.

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TABLE No. 1a.—*Calorimetric test, under air pressure equal to one-half inch of water.*

Number of test.	Time, Oct. 27.		Average pressure of steam absolute.	Weights.					Temperature in degrees Fahr.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.	P.	Calorimeter. b.	W+b.	W.	W+b+w.	w.	t'.	t.		
	A. M.	A. M.	*Pounds.*	*Lbs.*	*Pounds.*	*Pounds.*	*Pounds.*	*Lbs.*	*Pounds.*	*Pounds.*		*Pounds.*
1	7.58	7.59	264.5	75	415	340	424.5	9.5	90.6	57.5	1.042	398
2	8.29	8.30½	264.5	75	415	340	427.0	12.0	97.5	56.0	1.038	398
3	9.02	9.03	264.5	75	415	340	427.1	12.1	96.6	55.9	0.863	398
4	9.58	9.59	264.5	75	415	340	425.6	10.6	90.9	55.6	0.979	398
5	10.57	10.59	264.5	75	415	340	433.5	18.5	115.9	56.3	0.965	398
6	11.53	11.55	264.5	75	415	340	433.0	18.0	115.4	57.6	0.960	398
	P. M.	P. M.										
7	12.56	12.58	264.5	75	415	340	430.4	15.4	110.6	57.5	1.035	398
8	1.54	1.55½	264.5	75	415	340	433.3	18.3	117.9	57.1	1.009	398
9	2.57	2.58½	264.5	75	415	340	434.3	19.3	119.6	57.3	0.972	398
10	3.53	3.54	264.5	75	415	340	433.6	18.6	115.2	57.0	0.926	398
	Mean value of Q and temperature										0.978*	398

Percentage of moisture in the steam, 100 (1–Q) 2.11

TABLE No. 1b.—*Data obtained from tables No. 1 and No. 1a, and from which the computations for the potential evaporation are made.*

Average steam pressure, absolute P	264.5
Average temperature of the feed water, t_1	58.5
(*a*) Number of pounds of water vaporized, $W_1 \times Q$	83,771.87
(*b*) Number of pounds of water carried over with the steam, W_1 (1–Q)	1,895.38
Total heat of steam at pressure P	1,285.8
Total heat of water at temperature t_1	28.62
(*c*) Units of heat required to vaporize one pound of water from a temperature t_1 and under a pressure P	1,179.18
(c^1) Units of heat required to raise the temperature of one pound of water from t_1 to the temperature due to the pressure P	363.38
(*d*) Units of heat required to vaporize one pound of water from and at a temperature of of 212° and under atmospheric pressure of 14.7	965.8
Total heat required to vaporize the water, $a \times c$	98,782,113.67
Total heat required to raise the temperature of the water, $b \times c^1$	637,985.18
(*e*) Total heat obtained from the fuel, as measured by the steam discharged	99,420,098.85
(*f*) Units of heat obtained per pound of fuel	9,445.19
(*g*) Units of heat obtained per pound of combustible	10,270.67
$\frac{f}{c}$ Potential evaporation per pound of fuel, from a temperature t_1 and under a pressure P	8.01
$\frac{g}{c}$ Potential evaporation per pound of combustible from a temperature t_1 and under a pressure P	8.71
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel from and at a temperature of 212° and under atmospheric pressure	9.78
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure	10.63

TABLE No. 1c.—*Recapitulation of the results of the foregoing tests.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test, in hours	11.43
Fuel (Pocohontas bituminous) consumed	10,526
Refuse from fuel, in dry ashes, dust, and clinkers	846
Combustible consumed	9,680
Water fed to boiler, by meter measurement, W_1	85,577.25
Per cent of the fuel in dry refuse, etc	8.03

AVERAGE QUANTITIES.

Temperature of feed water, t_1	58.5
Temperature of steam, by thermometer	398.
Temperature of uptake	*536.

* 536.5. See appended sheet of corrections.

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Temperature of atmosphere	50.9
Temperature of fire room	78.
Barometer, in inches of mercury	29.43
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7 + pressure by gauge in pounds, P	204.7
Air pressure, in inches of water, at fire room bulkhead	0.5
Revolutions of blowing engines, per minute	560 to 620

Rates of combustion.	Fuel.	Combustible.
	Pounds.	*Pounds.*
Amount consumed per hour	916.66	843.
Amount consumed per hour per square foot of grate surface	24.12	22.18
Amount consumed per hour per square foot of heating surface	.374	.344

Vaporization in pounds of water.	Per pound of fuel.	Per pound combustible.
Apparent evaporation, by meter measurement, from a temperature, t_1 and under a pressure P	8.13	8.84
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	9.93	10.79
Actual evaporation into steam of quality Q, from a temperature t_1 and under a pressure P	7.96	8.65
Equivalent actual evaporation from and at 212° and under atmospheric pressure	9.72	10.57
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1, and under a pressure P	8.01	8.71
Equivalent potential evaporation from and at 212° and under atmospheric pressure	9.78	10.63

TABLE No. 2.—*Evaporative test under air pressure equal to 3 inches of water.*

Reference number.	Time, October 30.	Steam pressure by gauge at boilers.	Barometer (mercurial).	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures in degrees Fahr.					Air pressure.	Revolutions of blowing engines.
							Feed water, t_1.	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire-room.		
	A. M.	*Lbs.*	*Ins.*	*Pounds.*	*Pounds.*	*Pounds.*						*Ins.*	
1	6.30	250	29.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	
2	7.00	250	29.52	1,041.74	.....	6,705.56	58	398	780	46	.....	3	
3	7.30	250	29.54	1,041.74	.....	6,832.08	58	398	.....	46	80	3	
4	8.00	250	29.57	1,041.74	.....	7,717.72	58	398	720	47	.....	3	
5	8.30	250	29.59	1,041.74	.....	5,883.18	58	398	.....	47	84	3	
6	9.00	250	29.60	1,041.74	.....	6,326.00	58	398	750	47	.....	3	
7	9.30	250	29.62	868.12	.....	6,009.70	58	398	.....	47	88	3	
8	10.00	250	29.63	868.12	.....	5,566.88	58	398	730	54	.....	3	
9	10.30	250	29.64	868.12	.....	6,389.26	58	398	.....	55	88	3	
10	11.00	250	29.64	868.12	.....	5,503.62	58	398	740	55	.....	3	
11	11.30	250	29.65	651.09	.....	6,072.96	58	398	.....	55	90	3	
12	12.00	250	29.65	651.09	.....	6,452.52	58	398	730	55	.....	3	
	P. M.												990 to 1,160.
13	12.30	250	29.66	651.09	.....	5,060.80	58	398	.....	55	88	3	
14	1.00	250	29.66	651.09	.....	5,440.36	58	398	680	55	.....	3	
15	1.30	250	29.66	651.09	.....	5,440.36	58	398	.....	55	90	3	
16	2.00	250	29.67	651.09	.....	5,630.14	58	398	720	54	.....	3	
17	2.30	250	29.67	651.09	.....	3,452.78	58	398	.....	54	88	3	
18	3.00	250	29.68	578.75	.....	5,756.66	58	398	640	54	.....	3	
19	3.30	250	29.69	578.75	.....	4,744.50	58	398	.....	52	90	3	
20	4.00	250	29.70	578.75	.....	4,681.24	58	398	730	52	.....	3	
21	4.30	250	29.71	868.12	.....	6,009.70	58	398	.....	51	88	3	
22	5.00	250	29.72	744.10	.....	5,883.18	58	398	730	47	.....	3	
23	5.30	250	29.73	744.10	.....	5,693.40	58	398	.....	47	86	3	
24	6.00	250	29.74	238.03	.....	5,187.32	58	398	.....	46	.....	3	
			29.65	17,579.43	1,258.8	132,339.92			*722.73	51.3	87.3	3	

*653, see appended sheet of corrections.

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TABLE No. 2a.—*Calorimetric test, under air pressure equal to three inches of water.*

Number of test.	Time (Oct. 30). At beginning.	Time (Oct. 30). At end.	Average pressure of steam. Absolute. P.	Weights. Calorimeter b.	Weights. W+b.	Weights. W.	Weights. W+b+w.	Weights. w.	Temperatures in degrees Fahr. t'.	Temperatures in degrees Fahr. t.	Q.	Temperature of steam by thermometer.
	A. M.	A. M.	*Pounds.*									
1	7:50	7:51	264.5	75	415	340	430.8	15.8	106.8	55.7	0.9611	398
2	9:38	9:39	264.5	75	415	340	433.0	18.0	113.4	55.9	0.9512	398
3	9:56	9:57	264.5	75	415	340	432.6	17.6	113.4	55.8	0.9833	398
4	10:58	10:59	264.5	75	415	340	430.6	15.6	106.9	56.6	0.9509	398
5	11:54	11:55	264.5	75	415	340	430.5	15.5	105.4	56.5	0.9248	398
	P. M.	P. M.										
6	12:59	1:00	264.5	75	415	340	428.7	13.7	102.1	55.7	1.0159	398
7	1:56	1:57	264.5	75	415	340	430.4	15.4	105.1	55.9	0.9408	398
8	2:55	2:56	264.5	75	415	340	430.7	15.7	106.3	55.3	0.9617	398
9	3:57	3:58½	264.5	75	415	340	429.5	14.5	101.9	54.9	0.9562	398
10	4:59	5:00	264.5	75	415	340	431.1	16.1	107.3	55.0	0.9657	398
	Mean values of Q and temperature										0.9611	398

Percentage of moisture in the steam, 100 (1–Q) 3.89

TABLE No. 2b.—*Data obtained from tables No. 2 and No. 2a and from which the computations for the potential evaporation are made.*

Average steam pressure, absolute, P (corrected for barometer)	264.5
Average temperature of the feed water, t_1	58°
(*a*) Number of pounds of water vaporized, $W_1 \times Q$	127,191.90
(*b*) Number of pounds of water carried over with the steam, W_1 (1–Q)	5,142.62
Total heat of steam at pressure P	1,205.5
Total heat of water at temperature t_1	26.12
(*c*) Units of heat required to vaporize 1 pound of water from a temperature t_1 and under pressure P	1,179.08
(*c*¹) Units of heat required to raise the temperature of 1 pound of water from t_1 to the temperature due to the pressure P	353.83
(*d*) Units of heat required to vaporize 1 pound of water from and at a temperature of 212° and under atmospheric pressure of 14.7	965.8
Total heat required to vaporize the water, $a \times c$	150,045,737.18
Total heat required to raise the temperature of the water, $b \times c^1$	1,821,782.38
(*e*) Total heat obtained from the fuel, as measured by the steam discharged	151,867,519.56
(*f*) Units of heat obtained per pound of fuel	8,638.93
(*g*) Units of heat obtained per pound of combustible	8,205.25
$\frac{f}{c}$ Potential evaporation per pound of fuel, from a temperature t_1 and under a pressure P	7.32
$\frac{g}{c}$ Potential evaporation per pound of combustible, from a temperature t_1 and under a pressure P	7.89
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° and under atmospheric pressure	8.94
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible, from and at a temperature of 212° and under atmospheric pressure	8.49

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TABLE No. 2c.—*Recapitulation of the results of the foregoing tests.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test, in hours	1.5
Fuel (Pocahontas bituminous) consumed	17,579.43
Refuse from fuel, in dry ashes, dust, and clinkers	1,258.8
Combustible consumed	16,320.63
Water fed to boiler, by meter measurement, W_1	132,339.92
Per cent of the fuel in dry refuse, etc	7.16

AVERAGE QUANTITIES.

Temperature of feed water, t_1	58
Temperature of steam, by thermometer	398
Temperature of uptake	*722.73
Temperature of atmosphere	51.3
Temperature of fire-room	87.3
Barometer, in inches of mercury	29.63
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7 + pressure by gauge in pounds P	264.7
Air pressure, in inches of water, at fire-room bulkhead	3.
Revolutions of blowing engines per minute	990 to 1,160

Rates of combustion.	Fuel.	Combustible.
	Pounds.	*Pounds.*
Amount consumed per hour	1,528.64	1,419.19
Amount consumed per hour per square foot of grate surface	40.23	37.35
Amount consumed per hour per square foot of heating surface (interior or exterior)	0.624	0.579

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by meter measurement, from a temperature t_1 and under a pressure P	7.53	8.11
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	9.20	9.90
Actual evaporation, into steam of quality Q, from a temperature t_1 and under a pressure P	7.24	7.79
Equivalent actual evaporation from and at 212° and under atmospheric pressure	8.84	9.52
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1 and under a pressure P	7.32	7.89
Equivalent potential evaporation from and at 212° and under atmospheric pressure	8.94	9.63

*653. See appended sheet of corrections.

TABLE No. 3.—*Evaporative test under assisted draft (using blower, with fire-room hatch open, the air gauge showing no pressure).*

Reference number.	Time (Nov. 4)	Steam pressure by gauge at boilers.	Barometer.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperature in degree Fahr.					Air pressure	Revolutions of blowing engines.
							Feed water t_1	Steam by thermometer at boilers.	In uptake.	Atmosphere	Fire-room.		
	A. M.		*Inches.*	*Pounds*	*Pounds*	*Pounds.*						*Ins.*	
1	11.00	250	29.82	.....	.....	.....	.....	.....	.....	44	95	.....	.....
2	11.30	250	29.82	144	.....	1,582	52	398	420	44	90	0	.....
3	12.00	250	29.82	144	.....	1,518.72	52	398	420	44	89	0	.....
4	12.30	250	29.82	144	.....	1,582	52	398	420	43	87	0	240
5	1.00	250	29.82	144	.....	1,265.6	52	398	420	41	87	0	.....
6	1.30	250	29.82	144	.....	1,645.28	52	398	420	41	87	0	.....
			29.82	720	44	7,593.6	52	398	*420	43	89		

*871.5. See appended sheet of corrections.

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TABLE No. 3a.—*Calorimeter test, under assisted draft.*

Number of test.	Time (Nov. 4). At beginning.	Time (Nov. 4). At end.	Average pressure of steam absolute. P.	Weights. Calorimeter. b.	W+b.	W.	W+b+w.	w.	Temperature in degrees Fah. t'.	t.	Q.	Temperature of steam by thermometer.
	A. M.	*A. M.*	*Pounds*									
1	10. 21½	10. 23	264. 5	75. 0	415. 0	340	428. 1	13. 1	92. 9	49. 6	0. 8386	398
2	11. 31	.....	264. 5	75. 0	415. 0	340	428. 4	13. 4	95. 4	53. 3	0. 9074	398
	P. M.	*P. M.*										
3	12. 59	1. 00	264. 5	75. 0	415. 0	340	428. 5	13. 5	97. 6	53. 6	0. 9582	398
4	1. 37	1. 38	264. 5	75. 0	415. 0	340	427. 0	12. 0	92. 1	52 4	0. 9721	398
											3. 6763	
	Mean values of Q and temperature										0. 9191	398
	Percentage of moisture in the steam, 100 (1-Q)											8. 09.

TABLE No. 3b.—*Data obtained from tables No. 3 and No. 3a, and from which the computations for the potential evaporation are made.*

Average steam pressure, absolute, P (corrected for barometer)	264. 64
Average temperature of the feed-water, t_1	52.
(*a*) Number of pounds of water vaporized, $W_1 \times Q$	6, 979. 23
(*b*) Number of pounds of water carried over with the steam, $W_1 (1 - Q)$	614. 32
Total heat of steam at pressure P	1, 205. 76
Total heat of water at temperature t_1	20. 11
(*c*) Units of heat required to vaporize one pound of water from a temperature t_1 and under a pressure P	1, 185. 65
(c^1) Units of heat required to raise the temperature of one pound of water from t_1 to the temperature due to the pressure P	359. 95
(*d*) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure	965.
Total heat required to vaporize the water, $a \times c$	8, 274, 963. 3[illegible]
Total heat required to raise the temperaaure of the water, $b \times c^1$	221, 122. 68
(*e*) Total heat obtained from the fuel, as measured by the steam discharged	8, 496, 105. 28
(*f*) Units of heat obtained per pound of fuel	11, 880. 15
(*g*) Units of heat obtained per pound of combustible	12, 563. 20
$\frac{f}{e}$ Potential evaporation per pound of fuel, from a temperature t_1, and under a pressure P	9. 95
$\frac{g}{e}$ Potential evaporation per pound of combustible, from a temperature t_1 and under a pressure P	10. 60
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° and under atmospheric pressure	12. 2[illegible]
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure	13. 01

TABLE No. 3c.—*Recapitulation of the results of the foregoing tests.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test, in hours	2. 5
Fuel (Pocahontas bituminous) consumed	720
Refuse from fuel, in dry ashes, dust, and clinkers	44
Combustible consumed	676
Water fed to boiler, by tank measurement, W_1	7, 593. 6
Per cent of the fuel in dry refuse, etc	6. 11

AVERAGE QUANTITIES.

Temperature of feed-water, t_1	52
Temperature of steam, by thermometer	398
Temperature of uptake	[illegible]420
Temperature of atmosphere	43
Temperature of fire-room	90
Barometer, in inches of mercury	29. 82
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7 + pressure by gauge, in pounds, P	264. 7
Air pressure, in inches of water, at fire-room bulkhead	0
Revolutions of blowing engines, per minute	240

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Rates of combustion.	Fuel.	Combustible.
	Pounds.	*Pounds*
Amount consumed per hour	288.	270.4
Amount consumed per hour per square foot of grate surface	7.58	7.10
Amount consumed per hour per square foot of heating surface (interior or exterior)	.117	.110

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature t_1 and under a pressure P	10.55	11.23
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	12.96	13.79
Actual evaporation, into steam of quality Q, from a temperature t_1, and under a pressure P	9.69	10.32
Equivalent actual evaporation from and at 212° and under atmospheric pressure	11.90	12.67
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1 and under a pressure P	9.96	10.60
Equivalent potential evaporation from and at 212° and under atmospheric pressure	12.22	13.01

* 371.5. See appended sheet of corrections.

TABLE No. 4.—*Evaporative test, under air pressure equal to 4 inches of water. (Capacity test, blower at full speed.)*

Reference number.	Time (Nov. 4).	Steam pressure by gauge at boilers.	Barometer.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures in degrees Fah.					Air pressure.	Revolutions of blowing engines.
							Feed-water, t_1.	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire-rooms.		
	P. M.		*Ins.*	*Pounds.*	*Lbs.*	*Pounds.*						*Ins.*	
1	3.30	250	29.85	.....	.....	.....	.....	.....	.....	41	85	.....	
2	4.00	250	29.86	.....	.....	7,162.2	52	398	780	41	87	4	900 to 1100
3	4.30	250	29.86	.....	.....	7,162.2	52	398	790	40	87	4	
				2,529	158	14,324.4	52	398	*785	40.66	86.3		

* 713.6. See appended sheet of corrections.

TABLE No. 4*a*.—*Calorimeter test, under air pressure equal to 4 inches of water.*

Number of test.	Time (Nov. 4).		Average pressure of steam absolute. P.	Weights.					Temperatures.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter. *b.*	W+*b*.	W.	W+*b*+*w*.	*w*.	t^1.	*t*.		
	P. M.	*P. M.*	*Pounds.*									
1	3.18	3.19	264.5	75.0	415.0	340.0	430.1	15.1	97.1	51.7	0.8539	398
2	3.48	3.49	264.5	75.0	415.0	340.0	427.1	12.7	93.9	52.4	0.9606	398
3	4.03	4.04	264.5	75.0	415.0	340.0	427.5	12.5	94.0	52.4	0.9852	398
											2.7997	
	Mean values of Q and temperature										0.9332	398

Percentage of moisture in the steam, 100 (1—Q) 6.68

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TABLE No. 4*b*.—Data obtained from Tables No. 4 and No. 4*a*, and from which the computations of the potential evaporation are made:

Average steam pressure, absolute, P	264.68
Average temperature of the feed-water t_1	52.
(*a*) Number of pounds of water vaporized, $W_1 \times Q$	13,367.53
(*b*) Number of pounds of water carried over with the steam, W_1 (1—Q)	956.47
Total heat of steam at pressure P	1,205.76
Total heat of water at temperature t_1	20.11
(*c*) Units of heat required to vaporize 1 pound of water from a temperature t_1 and under a pressure P	1,185.65
(c^1) Units of heat required to raise the temperature of one pound of water from t_1 to the temperature due to the pressure P	359.95
(*d*) Units of heat required to vaporize 1 pound of water from and at a temperature of 212° and under atmospheric pressure	965.8
Total heat required to vaporize the water, $a \times c$	15,849,285.41
Total heat required to raise the temperature of the water, $b \times c_1$	344,421.53
(*e*) Total heat obtained from the fuel, as measured by the steam discharged	16,193,686.94
(*f*) Units of heat obtained per pound of fuel	6,426.27
(*g*) Units of heat obtained per pound of combustible	6,856.71
$\frac{f}{e}$ Potential evaporation per pound of fuel, from a temperature t_1 and under a pressure P	5.42
$\frac{g}{e}$ Potential evaporation per pound of combustible, from a temperature t_1 and under a pressure P	5.78
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° and under atmospheric pressure	6.65
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustile from and at a temperature of 212° and under atmospheric pressure	7.10

TABLE No. 4*c*.—*Recapitulation of the results of the foregoing tests.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

TOTAL QUANTITIES.

Duration of test, in hours	1
Fuel (Pocohontas bituminous) consumed	2,520
Refuse from fuel, in dry ashes, dust, and clinkers	158
Combustible consumed	2,362
Water fed to boiler, by tank measurement, W_1	14,324.4
Per cent of the fuel in dry refuse, etc	6.27

AVERAGE QUANTITIES.

Temperature of feed water, t_1	52
Temperature of steam, by thermometer	398
Temperature of uptake	*790
Temperature of atmosphere	45
Temperature of fire room	86
Barometer, in inches of mercury	29.86
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7 + pressure by gauge in pounds, P	264.7
Air pressure, in inches of water, at fire room bulkhead	4
Revolutions of blowing engines, per minute	900 to 1,100

*712.6. See appended sheet of corrections.

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Rates of combustion.	Fuel.	Combustible.
	Pounds.	*Pounds.*
Amount consumed per hour	2,520	2,362
Amount consumed per hour per square foot of grate surface	66.32	62.16
Amount consumed per hour per square foot of heating surface (interior or exterior)	1.028	.964

Vaporisation in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature t_1 and under a pressure P	5.69	6.06
Equivalent apparent evaporation from and at 212° and under atmospheric pressure	6.98	7.44
Actual evaporation, into steam of quality Q, from a temperature t_1 and under a pressure P	5.30	5.66
Equivalent actual evaporation from and at 212° and under atmospheric pressure	6.51	6.94
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature t_1 and under a pressure P	5.42	5.78
Equivalent potential evaporation from and at 212° and under atmospheric pressure	6.65	7.10

OFFICE OF EXPERIMENTAL BOARD,
Navy-Yard, New York, December 11, 1890

SIR: I have respectfully to state for the information of the Bureau of Steam Engineering, that the pyrometers used for ascertaining the uptake temperatures during the tests of the *Cushing's* boiler have been tested by the Ashcroft Manufacturing Company, the makers, and from the statement furnished me of the errors of indication I have computed the true temperatures for the several tests as given below:

	Degrees.
For the 3-inch air-pressure test	653
For the ½-inch air-pressure test	536.5
For the 4-inch air-pressure test	713.6
For the assisted draft test	371.5

Respectfully,

CHAS. H. LORING,
Chief Engineer, U. S. Navy.

Rear-Admiral D. L. BRAINE, U. S. Navy,
Commanding Naval Station, New York.

COMMANDANT'S OFFICE, NAVY-YARD,
New York, December 12, 1890.

Forwarded for information of the Bureau of Steam Engineering.

J. N. MILLER,
Captain, U. S. Navy, Commanding.

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APPENDIX B.

PROGRESSIVE HORSE-POWER TRIALS OF THE U. S. S. CUSHING.

NAVY DEPARTMENT, BUREAU OF STEAM ENGINEERING,
Washington, August 26, 1891.

SIR: In obedience to the appended detailed instructions, the board appointed to conduct a series of progressive horse-power trials of the U S. torpedo-boat *Cushing* has the honor to submit the following report, together with data, tables of performance, and the indicator cards taken:

The *Cushing* is a twin-screw steel torpedo boat of 118 tons displacement, and was contracted for and built by the Herreshoff Manufacturing Company, of Bristol, R. I.

She has a ram bow, overhanging stern, and a partially balanced rudder.

The motive power consists of two sets of quadruple expansion engines, of the inverted vertical cylinder type.

There are five cylinders in each set, there being two low-pressure cylinders. Their diameters are as follows: High pressure, 11.25 inches; first intermediate, 16 inches; second intermediate and first and second low pressure, each 22.5 inches; with a common stroke of 1.25 feet.

The cranks follow each other at an angle of 144°. Each cylinder has a piston valve, and the valves and main pistons run without oil, there being no arrangement for lubrication. The valves are actuated by cranks on a small shaft running parallel with the main shaft, and geared to it at the forward end by steel gear wheels. The engines are worked by partial rotations of this shaft, by hand. All pumps are independent, the only duty of the main engines being to actuate the screws.

There is one surface condenser, containing 1,052 square feet of cooling surface. It lies on the keel in the afterpart of the engine room, the tubes being fore and aft of the boat. The heads of the condenser are conical, and extend through the bottom of the boat about 8 inches, forming a scoop for the cooling water to enter and discharge while the boat is under way. The circulation of cooling water through the condenser while the vessel is at rest, and running at moderate speeds, is effected by a centrifugal pump actuated by a single vertical engine, while at very high speeds the circulation is effected by the passage of the vessel through the water.

There are three single-acting, vertical, single-trunk bucket air pumps for each main engine, placed alongsides, but above the condenser. The pumps are worked from a steel shaft, the cranks being 120° apart. On the same shaft are three vertical, single-acting plunger feed pumps. Each set of air and feed pumps is actuated by two single vertical engines. Their speed is geared down to that of the pumps in the ratio of 3. 2 to 1. These engines are controlled by a small ball governor, adjusted to give a speed of about 240 strokes per minute, as a maximum.

All of the auxiliary engines exhaust into the main condenser when the main engines are not in operation, and into the low-pressure receiver when under way.

There is a steering engine in the forward pilot house or conning tower, having two cylinders actuated directly from the steering wheel by beveled gearing. The cylinders are horizontal and arranged directly at the base of the wheel standard. It is readily accessible and efficient.

There are two boilers of the Thornycroft type in separate compartments, one forward of the engine room, and the other abaft.

The progressive trials under the instructions referred to consisted of four hours at different speeds of engines, each hour being divided into four periods of fifteen minutes each. The counters were read at the beginning and end of each fifteen-minute period, and the indicator diagrams were taken as soon as practicable after the beginning of each period. The revolutions recorded on the cards are the mean for that fifteen-minute period.

The machinery worked throughout without accident, with the exception of the port counter, which, during the fourth hour of the trial became unreliable, and finally ceased to operate. The revolutions were observed, however, at frequent intervals, and, as they showed a practical coincidence with those of the starboard engine, the indicated horse power of the two engines was assumed to be the same. The after-boiler was in use during the first two hours and both boilers during the last two hours of the trial.

The first period of the trial began at 10:43 a. m. July 20, 1891. The course was from off Alexandria, Va., to Indian Head.

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The second period began at 12:35 p. m.

The third period, beginning at 3:50 p. m., was, a part of the time, over water too shoal for the best results, the effect being to retard the speed of the boat in some degree, with a corresponding falling off in the engine speed. The character of the "wake" produced varied with the depth of water over which the boat was passing. During the passage over comparatively shoal water the stern assumed an abrupt, wall-like character, extending approximately at right angles to the course of the boat, and rising to an estimated height of 4 feet above the normal level. The normal "wake" of the *Cushing* in deep water is but slightly above the level of the water, and it spreads away from the stern, forming an outline not unlike that of a ship's plan of a considerable fineness.

The fourth period began at 6:18 p. m. from a point off Piney Point, but before the first subdivision of this period was concluded, the eccentric actuating the first low pressure indicator gear and the counter of the starboard engine loosened its key. To readjust it would have been impracticable without stopping the engine, and to transfer the indicator to the corresponding gear of the port engine would have brought the conclusion of the fourth period too late for accurate observations; so it was deemed advisable to postpone the fourth period of the trial until the next day. The boat was therefore steamed back to Piney Point and anchored for the night. During the night the necessary repairs were made, and after steaming for about an hour, the fourth period of the trial was begun at 7:1 a. m. July 21, from a point off the twin light-houses of Piney Point.

The course was then laid for Norfolk, where we arrived at 1:20 p. m.

Very respectfully, your obedient servants,

H. WEBSTER,
Passed Assistant Engineer, U. S. N.
HENRY HERWIG,
Passed Assistant Engineer, U. S. N.
C. A. CARR,
Assistant Engineer, U. S. N.
EMIL THEISS,
Assistant Engineer, U. S. N.
W. H. CHAMBERS,
Assistant Engineer, U. S. N.
H. G. LEOPOLD,
Assistant Engineer, U. S. N.

Engineer-in-Chief GEORGE W. MELVILLE, U. S. Navy,
Chief of Bureau of Steam Engineering, Navy Department, Washington, D. C.

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Synopsis of progressive horse-power trials of the U. S. S. Cushing, July 20 and 21, 1891.

Hull:
Material, steel.
Where built, Herreshoff Manufacturing Company, Bristol, R. I.
When built, trials for acceptance took place March, 1890.
Length on L. W. L., 138 feet 9 inches.
Length on deck, 135 feet 6 inches.
Beam extreme, 14 feet 10⅛ inches.
Beam at L. W. L., 14 feet 6¼ inches.
Ratio of length to breadth, 9.32 to 1.
Mean draft at L. W. L., 5 feet 3 inches.
Displacement per inch of immersion at L. W. L., 3 34 tons.
Area of load water plane, 1,405.78 square feet.
Coefficient of fineness on extreme dimensions, .39.
Draft at beginning of first hour:
Forward, 5 feet 2 inches.
Aft, 5 feet 11½ inches.
Mean, 5 feet 6¼ inches.
Amidships, 5 feet 6 inches.
Displacement, 130 tons.
Draft at beginning of fourth hour:
Forward, 4 feet 11½ inches.
Aft, 5 feet 11½ inches.
Mean, 5 feet 5⅝ inches.
Amidships, 5 feet 4 inches.
Displacement, 125 tons.
Object of trial: To ascertain H. P. at different speeds of engines.
Duration of trial: Three one-hour runs on July 20, and one one-hour run on July 21 (1891).
Trial conducted by Board of Engineer Officers.

Engines:
Type, vertical, inverted cylinder, direct acting, quadruple expansion (2 L. P. cylinders, five cylinders in all).
Number, two; one right, one left.

Cylinders:
High pressure, number, 1; diameter in inches, 11.25.
First inter. pressure, number, 1; diameter in inches, 16.
Second inter. pressure, number, 1; diameter in inches, 22.5.
Low pressure, number, 2; diameter in inches, 22.5.
Stroke, 15 inches.

Auxiliaries:
Two air and feed-pump engines; one circulating pump engine; two blower engines; one steam-steering engine; one steam capstan engine; one auxiliary feed pump in each fire-room.

Condenser:
Cooling surface, 1,052 square feet.
Steam, outside of tubes.
Ratio total cooling surface to total heating surface, .215 to 1.

Air pumps:
Number, three starboard and three port.
Type, vertical, single acting, single trunk, bucket.
Diameter of pumps, 10 inches.
Stroke of pumps, 5 inches.

Feed pumps:
Number, three starboard and three port.
Type, vertical, single acting, plunger.
Diameter of pumps, 2¾ inches.
Stroke, 5 inches.

Engines, air and feed pumps:
Type, one, simple, double cylinder, vertical engine for starboard, and one for port pumps (geared 3.2 to 1).
Diameter of cylinders, 3½ inches.
Stroke, 5 inches.

Circulating pumps:
Type, centrifugal.
Number, one.
Diameter of runner, 13.75 inches.
Number of steam cylinders, 1.
Diameter of steam cylinder, 4 inches.
Stroke, 4 inches.

Blowers:
Number, two, one for each fire-room.
Engine, single cylinder.
Diameter of cylinder, 4 inches.
Stroke, 4 inches.

Steering engines:
Type, horizontal, two cylinder, simple.
Diameter of cylinders, 2.5 inches.
Stroke, 3.5 inches.

Propellers:
Type, true screw.
Number, two; starboard, right-handed; port, left-handed.
Material, manganese bronze.
Diameter, 4.27 feet.
Mean pitch, starboard, 8.03 feet.
Mean pitch, port, 8.2 feet.
Helicoidal area of each, 9.366 square feet.
Weight of each, 506 pounds.

Boilers:
Type, Thornycroft.
Number, two.
Working pressure, 250 pounds.
Number of furnaces in each, one.
Grate surface, one boiler, 38.3 square feet.
Heating surface, one boiler, 2,451 square feet.
Ratio grate surface to heating surface, 1 to 64.
Weight one boiler and attachments, with water, 23,534 pounds.
Weight water in one boiler, 4,570 pounds.

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Performance.

	Average for hours.			
	a.	*b.*	*c.*	*d.*
Steam pressure at boiler per gauge, in pounds	84	116.5	191.9	222.5
Steam pressures H. P., steam chest, per gauge	65	98.8	173.3	218.8
Steam pressures absolute:				
First receiver	34.5	51.3	91	110
Second receiver	13.9	22	42.3	51.5
Third receiver	7.4	10.1	17.1	20.8
Vacuum in inches	25.3	24.1	23	19.9
Revolutions per minute:				
Starboard engine	205.9	240.1	298.8	328.3
Port engine	199.3	234.2	285.4	.....
Starboard air and feed pump engine	291	199	611	237
Port air and feed pump engine	319	554	429	545
Circulating pump engine	320	460	543	420
Forward blower engine	.....	.....	776	912
After blower engine	498	797	717	993
Temperature:				
Engine room	96	103	104	107
Fire room	139	130	148	125
Injection water	81	80	82	79
Feed water	88	104	126	149
Air pressure in inches of water:				
Forward fire room	.....	.....	1.06	2
After fire room	0.4	1.7	1.2	2.1
Grate surface in use, square feet	38.3	38.3	76.6	76.6
Mean pressure starboard, H. P. Cyl.:				
Top	27.24	39.2	60.15	67.45
Bottom	29.92	42.29	61.43	67.74
Mean pressure starboard, first I. P. Cyl.:				
Top	10.22	13.88	22.95	32.73
Bottom	9.4	13.01	19.45	29.56
Mean pressure starboard, second I. P. Cyl.:				
Top	5.5	8	13.32	15.09
Bottom	5.15	7.73	13.32	15.9
Mean pressure starboard, first L. P. Cyl.:				
Top	2.18	3.74	7.88	9.6
Bottom	1.96	3.26	6.31	8.43
Mean pressure starboard, second L. P. Cyl.:				
Top	1.68	3	6.13	7.29
Bottom	2.06	3.11	6.2	7.79
I. H. P.:				
Starboard, H. P. cylinder	43.61	72.51	134.66	164.59
Starboard, first I. P. cylinder	30.63	48.92	96.08	154.98
Starboard, second I. P. cylinder	32.87	56.59	119.25	158.61
Starboard, first L. P. cylinder	12.75	25.18	63.67	88.77
Starboard, second L. P. cylinder	11.55	22	55.48	74.35
Total power starboard engine	131.41	225.2	469.14	636.3
Total power port engine	129.89	224.32	457.4	636.3
Total power both main engines	261.3	449.52	926.54	1,272.6
Total power both main engines and air and feed pumps	277.2	469.22	953.84	1,292.1
Total power main and auxiliary engines	286.1	484.02	971.24	1,336.2
Speed, by observation, in knots per hour	13.08	13.4	15.42	17.5

Estimated maximum I. H. P. of auxiliary machinery in use during trial.

Starboard air and feed pump engine	7.6	5.2	16	6.2
Port air and feed pump engine	8.3	14.5	11.3	14.3
Circulating pump engine	4.5	4.5	4.5	4.5
Forward blower engine	.....	.....	5.8	12.9
After blower engine	3.4	9.6	6.1	14.7
Steering engine	1	1	1	1
Total auxiliary horse power	24.8	34.8	44.7	53.6
Square feet cooling surface, per collective horse power	3.68	2.17	1.08	0.79
I. H. P., collective, per square foot grate surface	7.47	12.64	12.68	17.44
I. H. P., main engines, air and feed pumps, per square foot grate surface	7.24	12.25	12.45	16.87

NOTE—Owing to lack of opportunity, the indicators used on the *Gushing's* trial were not standardized, and consequently there is a probable error in the horse powers given of from 3 to 10 per cent. Experience with several other vessels where the indicators were standardized has shown that it would probably be fair to allow a reduction of 5 per cent from the horse powers as recorded.

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NAVY DEPARTMENT,
Washington, July 14, 1891.

SIR: A board, composed of yourself as senior member, Passed Assistant Engineer Henry Herwig, and Assistant Engineers C. A. Carr, Emil Theiss, William H. Chambers, and H. C. Leopold, members, is hereby appointed to convene on board the U. S. torpedo boat *Cushing*, navy-yard, Washington, D. C., on the 16th instant, for the purpose of making a horse-power trial of the engines of that vessel during her trip to Fort Monroe or Norfolk, Va.

You will report to the commandant and convene the board at the time mentioned, the members of which have been directed to report to you.

On arriving at Fort Monroe or Norfolk, return to Washington and resume your present duties.

You will be guided in the performance of this duty by the following instructions, viz:

It is desired to have a series of progressive trials, each lasting an hour, beginning at either 150 or 200 revolutions per minute, and increasing by increments of 50 revolutions per minute to the maximum, which can be maintained by the engineer's force on board. The engines have made 370 revolutions per minute, and, if possible, it is desired that the highest number on the trial should be near this figure. If this is practicable, the lowest number taken will be 200. If, however, it is found that it will be impracticable to maintain the revolutions much above 300, the lowest number taken will be 150.

There will thus be four trials, each lasting an hour.

You will confer with the commanding officer of the *Cushing* in regard to the highest speed which it is practicable to maintain, and be governed by his opinion in the matter.

You will so distribute the members of the board as to obtain the data accurately and exhaustively. It is presumed that the best distribution will be three officers to take cards and one at each engine to observe and record data.

The cylinders of one engine only will be indicated, as it is impracticable, owing to the limited size of the boat, to send the necessary number of observers to indicate both engines.

For each rate of speed four cards will be taken from each cylinder of the engine, one every fifteen minutes. The cards from all cylinders will be taken as nearly simultaneously as possible. If a card is found defective, another will be taken at once to replace it. The counters attached to the engine shafts will be read every fifteen minutes, and a careful record kept of their readings. For computing the horse power, the average of the fifteen minutes during which the cards were taken, will be used.

A signal will be given by a shrill whistle (or otherwise as you may find best), at each reading of the counter, and the cards will be taken immediately after each whistle, except the last of the hour, which will be the signal that that run is ended.

A sufficient interval between the various trials will be allowed to permit the engines to attain a steady rate of running before taking cards.

All the data called for on the indicator cards will be filled in, where practicable, and, in addition, on each card will be placed the make of the indicator and the number of the spring used. The cards will be placed in the special envelopes provided.

You will also secure for insertion in your report the diameter and stroke of the main cylinders, and the diameter of their piston rods; also the diameter and stroke of all auxiliary steam cylinders, and the diameter of their rods.

If practicable, an estimate of the amount of coal burned at each rate of speed will be obtained.

Although only one engine is to be indicated, the revolutions of the other engine will be taken at the same time, and with the same care, so that an accurate estimate of the power developed by it may be made from the calculated indicated horse power of the other.

You will also secure, as accurately as practicable, the length, beam, and draft of water at the time of the trial, so that the displacement can be determined.

If practicable, sufficiently numerous data of the working of auxiliary machinery will be obtained, to enable an estimate to be made of the indicated horse power.

Instructions have been issued to the commanding officer to make careful observations for determining the speed of the vessel for each trial. You will secure these results from him and embody them in your report.

After the trials are over, you will direct the officers assisting you to clean the indicators, and replace them in their boxes. These you will take with you when you leave the boat at Fort Monroe or Norfolk, and you will ship them by express to the Bureau of Steam Engineering.

The Department wishes to impress upon you that the data to be obtained on these trials, if carefully secured, will be of very great value, and you will therefore spare no pains to make your results as accurate and complete as possible.

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If you discover that any data not called for in these instructions will be useful or add to the value and completness of your report, you will take pains to secure them.

After your return to the Department you will, with the aid of those officers who are also on duty in the Bureau of Steam Engineering, work out the horse power developed, compute the averages, do all other work necessary to a complete report, and then submit your report to the Bureau of Steam Engineering.

Very respectfully,

B. F. TRACY,
Secretary of the Navy.

Passed Assistant Engineer HARRIE WEBSTER, U. S. Navy,
Bureau of Steam Engineering, Navy Department, Washington, D. C.

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APPENDIX C.

TESTS OF MANGANESE BRONZE AT THE NAVY-YARD, NEW YORK.

DEPARTMENT OF STEAM ENGINEERING,
Navy-Yard, New York, November 22, 1890.

SIR: Referring to Bureau's letter No. 1958 KK, dated July 5, 1890 (copy annexed), I herewith inclose tables and strain diagrams showing the results of the tests.

The piece of manganese bronze received here was cut up and as many test specimens, of suitable dimensions, as possible obtained from it. The tests, except those by torsion, were made with the Fairbank's testing machine. The tests by torsion were made in a lathe. The specimen, the ends of which were of square section, was supported between the two centers of the lathe, with one end secured to the face plate and having on the other end a balanced lever, to which the weights were applied. After the application of each weight, the face plate was turned by hand until the lever was brought to a horizontal position. The reading was then taken from a tape secured to the circumference of the face plate.

In the crushing tests of the one-inch specimens, table three, the metal was compressed until the limit was reached, when the specimen gave way by shearing on a single diagonal.

The results of the crushing tests of the two-inch specimens are of little value, and are not used in making up the averages, from the fact that the specimens yielded by flexure, taking the form of a letter "S," and finally slipping from between the crushing surfaces without having been fractured.

The fracture and surface cracks of the tensile specimens show that the metal is not homogeneous, many cavities showing around which the metal has grouped itself in large crystals.

Very respectfully,

W. W. DUNGAN,
Chief Engineer, U. S. Navy.

The COMMANDANT,
Navy-Yard, New York.

[In the bending tests, when a load of about 1,000 pounds had been applied, the specimens were deflected enough to bear on the edges of the supporting blocks instead of on the rollers, thus changing the length between supports from 13 to 9 inches. The modulus of rupture was calculated for a length of 9 inches.]

BUREAU OF STEAM ENGINEERING, NAVY DEPARTMENT,
Washington, July 5, 1890.

SIR: The firm of B. H. Cramp & Co. have kindly furnished, for the use of the Bureau in testing, some specimens of manganese bronze taken from one of the blades of a propeller which they were breaking up. These specimens have already been shipped to you.

Please direct the chief engineer of the yard to have test specimens made from these and to have tests of tensile, compressive, transverse, and torsional stress made upon them. From the size of the pieces furnished by Messrs. Cramp, it seems probable that enough specimens can be made to make at least two tests of each kind of stress. In any case, the Bureau desires as many tests of each kind of stress made as the pieces will allow.

Very respectfully,

W. H. H. SMITH,
Acting Chief of Bureau.

The COMMANDANT,
Navy-Yard, New York, N. Y.

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TABLE I.—*Tensile tests.*

Form of section, round; diameter, 0.7 inch; length between fillets, 8 inches.

[Tests made by F. H. Conant, Assistant Engineer, U. S. Navy.]

Number of specimen.	Breaking load (actual).	Breaking load per square inch.	Extension.	Extension of original length.	Diameter at fractured section.	Reduction of area.
	Pounds.	*Pounds.*	*Inches.*	*Per cent.*	*Inches.*	*Per cent.*
4.....	13,200	34,375	0.328	4.1	0.665	9.75
5.....	14,400	37,500	0.484	6.1	0.664	9.75
6.....	18,000	46,875	0.984	12.3	0.640	17.19
7.....	12,000	31,250	0.203	2.5	0.666	9.75
8.....	14,800	38,541	0.516	6.5	0.662	9.75
9.....	15,900	41,406	0.609	7.6	0.659	11.64
Means	14,717	38,324.5	0.521	6.52	0.659	11.30

TABLE II.—*Bending tests.*

Form of section, square; dimensions of section, 0.7 by 0.7 inches; length between supports, 13 and 9 inches; specimen supported at ends and loaded in center.

Tests made by F. H. Conant, Assistant Engineer, U. S. Navy.]

Applied load.	Deflection.		Modulus of rupture. $f=\frac{3Wl}{2bh^2}$
	Specimen No. 1.	Specimen No. 2.	
Pounds.	*Inches.*	*Inches.*	
250	0.062	0.031	.....
500	0.219	0.155	.....
750	0.686	0.558	.....
1,000	1.705	1.519	.....
1,250	1.736	1.550	.....
1,500	1.891	1.674	.....
1,700	*2.170	1.860	65571
1,850	.....	2.077	.....
1,900	.....	*2.294	73286

*Broke.

TABLE III.—*Compressive tests.*

Form of section, square; dimensions of section, 0.7 by 0.7 inches; length, 1 inch

[Tests made by F. H. Conant, Assistant Engineer U. S. Navy.]

Applied load.	Load per square inch.	Compression.					
		Specimen No. 10.	Specimen No. 11.	Specimen No. 12.	Specimen No. 10.	Specimen No. 11.	Specimen No. 12.
Pounds.	*Pounds.*	*Inches.*	*Inches.*	*Inches.*	*Per cent.*	*Per cent.*	*Per cent.*
7,500	15,000	0.007	0.009	0.008	0.7	0.9	0.8
15,000	30,000	0.023	0.025	0.023	2.3	2.5	2.3
22,500	45,000	0.040	0.054	0.054	4.0	5.4	5.4
30,000	60,000	0.072	0.089	0.089	7.2	8.9	8.9
37,500	75,000	0.109	0.127	0.128	10.9	12.7	12.8
45,000	90,000	0.156	0.168	0.169	15.6	16.8	16.9
52,500	105,000	0.212	0.211	0.212	21.2	21.1	21.2
60,000	120,000	0.260	0.256	0.257	26.0	25.6	25.7
67,500	135,000	0.307	0.303	0.303	30.7	30.3	30.3
75,000	150,000	0.350	0.352	0.350	35.0	35.2	35.0
75,600	151,200	(*)	.....	.....	.....	.....	.....
76,000	152,000	.....	(*)	.....	.....	.....	.....
82,500	165,000	.....	.....	0.398	.....	.....	39.8
83,500	167,000	.....	.....	(*)	.....	.....	.....

*Broke.

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TABLE IV.—*Compressive tests.*

Form of section, square; dimensions of section, 0.7 by 0.7 inches; length, 2 inches

[Tests made by F. H. Conant, Assistant Engineer U. S. Navy.]

Applied load.	Load per square inch.	Compression.					
		Specimen No. 13.	Specimen No. 14.	Specimen No. 15.	Specimen No. 13.	Specimen No. 14.	Specimen No. 15.
Pounds.	*Pounds.*	*Inches.*	*Inches.*	*Inches.*	*Per cent.*	*Per cent.*	*Per cent.*
7,500	15,000	0.008	0.008	0.010	0.8	0.8	1.0
15,000	30,000	0.031	0.031	0.047	3.1	3.1	4.7
22,500	45,000	0.125	0.094	0.109	12.5	9.4	10.9
30,000	60,000	0.281	0.235	0.266	28.1	23.5	26.6
30,280	60,400	(†)	.....	.....	.....	.....	.....
30,900	61,800	.....	(†)	.....	.....	.....	.....
32,100	64,200	.....	.....	(†)	.....	.....	.....

† Slipped.

TABLE V.—*Torsional tests.*

Form of section, round; diameter, 0.605 inches; length between fillets, 4.5 inches

[Tests made by F. H. Conant, Assistant Engineer, U. S. Navy.]

Weight on lever.	Moment in inch.	Angle of torsion.		Stress on outer fiber per square inch from $f = \frac{5.M}{d^3}$
		Specimen No. 2.	Specimen No. 2½.	
Pounds.	*Pounds.*	*Degrees.*	*Degrees.*	
5	60	0.	0	1,381.8
10	120	0	0	2,763.6
15	180	0.5	0.5	4,145.4
20	240	1.0	1.0	5,527.2
25	300	1.5	1.5	6,909.0
30	360	2.0	2.0	8,290.8
35	420	2.5	2.5	9,672.6
40	480	3.0	3.0	11,054.4
45	540	4.0	3.5	12,436.2
50	600	5.0	4.0	13,818.0
55	660	7.0	5.0	15,199.8
60	720	11.0	7.0	16,581.6
65	780	16.0	11.0	17,963.4
70	840	22.0	17.0	19,345.2
75	900	29.0	25.0	20,727.0
80	960	37.0	34.0	22,108.8
85	1,020	47.0	43.0	23,490.6
90	1,080	59.0	52.0	24,872.4
95	1,140	72.0	62.0	26,254.2
100	1,200	86.0	72.0	27,636.0
105	1,260	100.0	82.0	29,017.8
110	1,320	115.0	92.0	30,399.6
115	1,380	130.0	102.0	31,781.4
120	1,440	145.0	112.0	33,163.2
125	1,500	161.0	123.0	34,545.0
130	1,560	177.0	134.0	35,926.8
135	1,620	193.0	145.0	37,308.6
140	1,680	209.0	156.0	38,690.4
145	1,740	226.0	169.0	40,072.2
150	1,800	243.0	184.0	41,454.0
155	1,860	261.0	201.0	42,835.8
160	1,920	280.0	220.0	44,217.6
165	1,980	301.0	240.0	45,599.4
170	2,040	325.0	261.0	46,981.2
175	2,100	354.0	283.0	48,363.0
180	2,160	389.0	307.0	49,744.8
185	2,220	432.0	333.0	51,126.6
190	2,280	503.0	362.0	52,508.4
195	2,340	509.0	395.0	53,890.2
200	2,400	Broke.	432.0	55,272.0
205	2,460	.....	474.0	56,653.8
210	2,520	.....	522.0	58,035.6
515	2,580	.....	591.0	59,417.4
220	2,640	.....	Broke.	.....

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TABLE VI.—*Summary of average results of tests of Manganese bronze.*

[Tests made by F. H. Conant, Assistant Engineer, U. S. Navy.]

Tension.			Compression.		Bending.			Torsion.		
Tensile strength per square inch.	Total elongation.	Reduction of area.	Crushing strength per square inch.	Total compression.	Breaking weight.	Total deflection.	Modulus of rupture.	Total torsional moment in inch.	Total angle of torsion.	Total stress on outer fiber per square inch.
	Per ct.	*Per ct.*		*Per ct.*	*Pounds.*	*Inches.*		*Pounds.*	°	
38, 324. 5	6. 5	11. 30	156, 733	36. 6	1, 800	2. 232	69, 428. 5	2, 460	547	56, 653. 8

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APPENDIX D.

TEST OF A LAUNCH BOILER AT THE NEW YORK NAVY-YARD.

The boiler is of the Towne patent, belonging to the general class of tubulous or pipe boilers. The details of its construction are shown on plates 19–19½.

The grate surface is 3.25 square feet, and the heating surface 65 square feet; there are seventy-five tubes 1¼ inches in external diameter, and 23½ inches in exposed length between tube sheets. The sides of the boiler form water casings, the inner sheet of each pair being the tube sheet, which is one-quarter inch thick, while the outer sheet is five-sixteenths inch thick. The two sheets are secured by screw stays, with riveted heads at each end. The upper end of each water casing is connected to a cylindrical drum 9 inches in external diameter by a series of pipes three-fourths inch in internal diameter. A system of baffle plates is fitted inside the drum and above the tube ends to throw the water carried with the steam to the bottom of the drum, from which it descends by two copper pipes, external to the boiler, to the bottom of the water casings along with the feed water. A perforated trough secured to the upper part of the shell acts as a dry pipe, and the steam pipe is connected near one end of this trough. The feed water enters the drum at one end after passing through a series of pipes in the uptake which act as a feed-water heater. The surface of these pipes is included in the value given for the heating surface. There are water casings at the front and back similar to those forming the sides, except that they are perfectly straight and are secured by socket rivets instead of screw stays. The tubes are inclined at an angle of about 25° in two sets, leaning in opposite directions, thus giving an excellent natural circulation. In the outer sheet of the side water casings are screw plugs directly opposite the end of each tube to enable the tubes to be expanded, and also to facilitate examination and repairs. The smokepipe to the boiler has an internal diameter of 7 inches, and is 7 feet 8 inches high above the grate.

The weight of the boiler complete, including smokepipe, but without water, is 1,100 pounds; with water and ready for steaming, 1,400 pounds.

The tests were made in the early part of June, 1890, under the general supervision of Chief Engineer W. W. Dungan, U. S. N., by Passed Assistant Engineer George Cowie, U. S. N., and Assistant Engineer F. H. Conant, U. S. N.

The boiler was set up in the rear of the machine-shop boiler house at the New York navy-yard.

The feed water was supplied from two barrels connected to the feed pump by suitable piping and valves. Each barrel was fitted with a float connected to an index which registered upon a scale attached to the front. The scale was graduated by pouring in 10 pounds of water at a time (at a temperature of 64°) and marking the position of the index. This process was continued until 320 pounds of water had been measured into each barrel, after which an additional 20 pounds was added to prevent the pipe connecting to the feed tank from being uncovered, thus preventing the pump from forcing air into the boiler.

During the test, when the index showed that 320 pounds of water had been pumped out of a barrel, the connection from that barrel to the feed pump was shut, and the other barrel (which had previously been filled) was connected. While one barrel was being emptied, the other was filled at a more rapid rate in order to insure the filling of the barrel to the proper level each time.

The coal was carefully weighed in lots of 80 pounds. At the end of each test, if any coal remained, it was weighed and the weight subtracted from the charge for the last lot. The refuse from the coal was weighed dry.

Forced draft was supplied on the closed ashpit system by a small blower and engine similar to those designed by the Bureau of Steam Engineering for navy launches.

There were four tests, each lasting four hours. Two were made with anthracite coal taken from the pile supplying the boilers for the steam engineering department, and two with semibituminous coal known as Georges Creek.

One test with each kind of coal was under natural draft, and the other under forced draft, with an average air pressure of about 1⅛ inches of water. The steam pressure was kept uniform at 160 pounds on the steam gauge attached to the boiler by regulating a stop valve through which the steam discharged into the atmosphere.

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For each test the boiler was worked sufficiently long to get the water to a proper level and the fire clean and of normal thickness. The height of the water level and the condition of the fire were carefully noted, the feed pump connected with a full barrel of water, and the test held to commence. When working under forced draft the blower and feed pump were in operation at beginning of trial.

The data given below were taken every fifteen minutes, and the entries are the observed data except the revolutions of the blower, which are the mean for the fifteen minute interval, deduction being made of the time when the blower was stopped to fire or haul the ashpan.

It was found that, after each charge of coal was placed on the fire while under forced draft, steam was generated more rapidly, making it necessary to open the stop valve for regulating the pressure which was accompanied by a rise of the water level in the gauge glass. It was found, however, upon trying the gauge cocks that there was solid water, and that the rise in the glass was not due to foaming. When the pressure began to fall the stop valve was gradually closed and the water level in the glass dropped. This was true both of the anthracite and bituminous coal.

Although the air pressure was about the same with the anthracite and the bituminous coal, the quantity of the former burned per square foot of grate per hour was nearly 11 ponnds greater. While burning anthracite coal the furnace door was frequently red hot, and flame shot out to a height of about 5 feet above the smokepipe. With bituminous coal under forced draft, the furnace door was not unduly heated nor was flame projected above the smokepipe; the difference probably being due to the smaller amount of coal burned per square foot of grate.

Calorimetric tests to determine the dryness of the steam were made at intervals, as shown by the tabular record. The weights were determined by an accurate Fairbanks scale. The temperature of the steam was calculated from the pressure and not directly observed. The steam gauge was carefully standardized, and the pressures given in the tables are the true ones obtained by applying the corrections to the maintained gauge pressure of 160 pounds.

As the end of each test approached, the boiler was worked so as to leave the water level and the fire at the end of the four hours in the same condition as at the beginning.

At the conclusion of the tests the boiler was carefully inspected and found to be perfectly tight.

TABLE I.—*Test with anthracite coal under forced draft, June 2.*

Time.	Steam pressure per gauge.	Revolutions of blower per minute.	Air pressure in ash pit of water.	Water fed to boiler during the fifteen-minute period.	Temperature of feed water in degrees Fahr.	Temperature of external air in degrees Fahr.	Moisture in the steam.
			Inches.	*Pounds.*			*Per cent.*
12.00	157	.....	.....	.....	.....	.....	.....
.15	157	1,407	1.3	110	68	91	.....
.30	157	1,303	1.1	120	67	94	.....
.45	157	1,117	1.3	140	67	94	.....
1.00	157	1,360	1.1	125	70	94	2.4
.15	157	1,277	1.3	145	70	95	.....
.30	157	1,347	1.1	130	68	94	.....
.45	157	1,163	1.2	140	68	94	.....
2.00	157	1,267	1.2	150	66	94	9.1
.15	157	1,146	1.1	130	68	94	.....
.30	157	1,263	1.1	120	68	96	.....
.45	157	1,169	1.1	155	68	96	.....
3.00	157	1,403	1.1	115	68	94	—1.8
.15	157	1,123	1.2	80	68	94	.....
.30	157	1,330	1.2	150	68	94	.....
.45	157	1,200	1.1	115	68	94	.....
4.00	157	1,343	1.1	125	68	94	4.8

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TABLE II.—*Test with anthracite coal under natural draft, June 3.*

Time.	Steam pressure per gauge.	Velocity of air entering ash-pit per minute.	Water fed to boiler during the fifteen-minute period.	Temperature of feed water in degrees Fahr.	Temperature of external air in degrees Fahr.	Moisture in steam.
		Feet.	*Pounds.*			*Per cent.*
9.30	156					
.45	156	160	40	78	83	
10.00	156	140	30	78	83	
.15	156	150	40	78	85	4.1
.30	156	130	40	79	85	
.45	156	150	40	79	86	
11.00	156	130	40	79	86	4.6
.15	156	140	40	79	87	
.30	156	140	40	79	87	
.45	156	120	30	79	87	8.8
12.00	156	130	40	78	87	
.15	156	140	30	79	86	
.30	156	150	40	79	86	10.4
.45	156	140	30	79	86	
1.00	156	150	40	80	87	
.15	156	160	30	80	87	2.8
.30	156	150	40	81	87	

TABLE III.—*Test with semibituminous coal under forced draft, June 4.*

Time.	Steam pressure per gauge.	Revolutions of blower per minute.	Air pressure in ash pit of water.	Water fed to the boiler during the 15-minute period.	Temperature of feed water in degrees Fahr.	Temperature of external air in degrees Fahr.	Moisture in steam.
			Inches.	*Pounds.*			*Per cent.*
9–45	155						
10–00	155	1,280	1.1	90	78	87	
15	155	1,300	1.1	100	78	88	
30	155	1,357	1.1	110	78	89	4.47
45	155	1,017	1.1	140	74	90	
11–00	155	1,233	1.1	120	74	91	2.59
15	155	1,160	1.1	85	66	92	
30	155	1,120	1.0	115	66	93	17.3
45	155	1,380	1.0	110	66	94	
12–00	155	1,313	1.1	110	68	94	12.5
15	155	1,313	1.1	110	68	95	
30	155	1,278	1.1	100	68	95	
45	155	1,317	1.1	80	70	96	1.8
1–00	155	1,373	1.1	110	70	96	
15	155	1,370	1.1	125	70	96	
30	155	1,170	1.1	105	70	96	4.9
45	155	1,107	1.1	110	70	96	

TABLE IV.—*Test with semibituminous coal under natural draft, June 5.*

Time.	Steam pressure per gauge.	Velocity of air entering ash pit per minute.	Water fed to the boiler during the 15-minute period.	Temperature of feed water in degrees Fahr.	Temperature of external air in degrees Fahr.	Moisture in steam.
		Feet.	*Pounds.*			*Per cent.*
10–30	154					
45	154	160	35	83	91	
11–00	154	210	35	83	92	7.8
15	154	110	30	84	93	
30	154	130	30	84	94	
45	154	150	30	85	95	
12–00	154	160	30	85	96	7.8
15	154	130	20	86	96	
30	154	160	20	87	97	
45	154	180	20	88	97	
1–00	154	110	30	89	98	12.4
15	154	150	30	90	98	
30	154	180	20	91	98	
45	154	120	10	92	98	
2–00	154	150	20	86	98	5.5
15	154	130	20	86	98	
30	154	150	25	87	98	

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Summary of results of tests of Towne Launch Boiler at the New York navy-yard in June, 1890.

		Anthracite coal.		Semi-bituminous coal.		
		Forced draft.	Natural draft.	Forced draft.	Natural draft.	
1	Duration of test (hours)	4	4	4	4	1
2	Steam pressure, per gauge, pounds	157	156	155	154	2
3	Air pressure, inches of water	1.16	.....	1.09	.....	3
4	Revolutions of blower, per minute	1,256	.....	1,255	.....	4
5	Velocity of air entering ash-pit, feet per minute	.....	142	.....	149	5
6	Temperature of feed water in degrees, Fahr.	68	79	71	87	6
7	Temperature of external air, in degrees, Fahr.	93	86	93	96	7
8	Coal per hour, pounds	104.56	21.5	69.75	14.44	8
9	Refuse per hour, pounds	28.87	5.0	7.62	2.44	9
10	Refuse per cent	27.6	23.2	10.93	16.88	10
11	Coal per hour, per square foot of grate surface, pounds.	32.17	6.61	21.53	4.44	11
12	Coal per hour, per square foot of heating surface, pounds.	1.61	0.33	1.07	0.22	12
13	Water fed to boiler, per hour, pounds	525.00	145.00	427.5	98.75	13
14	Apparent evaporation per hour in pounds. — per pound of coal	5.02	6.74	6.13	7.01	14
15	Apparent evaporation per hour in pounds. — per pound of combustible	6.94	8.79	6.88	8.23	15
16	Apparent evaporation per hour in pounds. — per square foot of heating surface	8.08	2 23	6.58	1.52	16
17	Apparent evaporation per hour in pounds. — per pound of coal from and at 212°	6.02	8.00	7.33	8.26	17
18	Apparent evaporation per hour in pounds. — per square foot of heating surface, from and at 212°.	9.69	2.65	7.87	1.79	18
19	Percentage of moisture in the steam	3.62	6.04	7.26	8.37	19
20	Actual evaporation, being apparent evaporation, less percentage of moisture. — per pound of coal, from and at 212°.	5.80	7.52	6.80	7.57	20
21	Actual evaporation, being apparent evaporation, less percentage of moisture. — per square foot of heating surface, from and at 212°.	9.34	2.49	7.20	1.64	21

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REPORT

OF

THE PAYMASTER-GENERAL OF THE NAVY.

NAVY DEPARTMENT,
BUREAU OF PROVISIONS AND CLOTHING,
Washington, D. C., October 15, 1891.

SIR: I have the honor to submit the report of the Paymaster-General of the Navy for the fiscal year ending June 30, 1891, with estimates of appropriations needed for the coming fiscal year and tabulated statements as follows:

(A) General financial statement.
(B) Statement of clothing and small stores fund, provisions, and contingent.
(C) Statement of expenditures at shore stations and objects to which applied.
(D) Compilation, showing cost of maintaining all naval vessels in commission during year ending June 30, 1891.
(E) Value of supplies at shore stations, by classes, June 30, 1891.
(F) Value of supplies at shore stations June 30, 1891, under accounts A, B, C, and D.
(G) Value of supplies afloat June 30, 1891.
(H) Statement showing value of real estate and chattels and machinery plant at the several navy-yards and stations June 30, 1891.
(I) Statement of public sales and report of deposits on account of sales during the fiscal year 1891.
(J) Summary of open purchase requisitions and bureau orders acted upon.
(K) Comparative statement of expenditures at shore stations for the years 1890 and 1891.
(L) Schedule of proposals received.
(M) Statement showing expenditures to June 30, 1891, on vessels completed or authorized since March 4, 1885.
(N) Estimates of appropriations for the fiscal year 1893.

During the past year, under the provisions of the act of Congress approved June 30, 1890, naval supplies have for the first time been treated as property belonging to the Navy and not to any bureau thereof. The returns from the several yards and stations for the fiscal year immediately preceding the passage of the act indicated an increase in the quantity of supplies in store of nearly $300,000 over the amount on hand at the close of the year before, the balance June 30, 1890, being $17,307,088.50. The returns for the last fiscal year show a decrease of over $1,400,000, the total balance for all supplies in charge of general storekeepers on hand June 30, 1891, being $15,870,721.83. About $300,000 of this decrease is due to the expenditure from the books, under instructions from the Bureau, of certain machine tools and other property placed in use in the navy-yards prior to June 30, 1891, properly belonging to the plant of the yards, but which were being carried on the books of the storekeepers as supplies in store. These have now been transferred to the plant account.

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The consumption of old stores, *i. e.*, supplies in store at the beginning of the year, formerly belonging to the several bureaus but made available for general issue by the act above cited, amounted to $569,000, obviating purchases to that extent.

The growth of the Navy has called for greatly increased expenditures at shore stations during the past fiscal year, the excess over 1890 being about three and a half million. It is a significant fact, however, that while the increase in the amount of "supplies" purchased was $700,000, the increase in the quantity expended "for use" was $1,400,000.

The total value of all naval supplies afloat and at shore stations, as borne upon the books June 30, 1891, was $22,110,391.51, showing a net decrease as compared with the preceding year of $169,000, and this notwithstanding the fact that during the year there have been added to the permanent stores of the Navy articles manufactured in the navy-yards, such as guns, gun carriages, anchors, etc., aggregating in value $1,600,000, which sum is included in the balance above stated.

In view of these facts it must be conceded that the returns for the fiscal year just closed indicate that under the present system of consolidated supplies and a single purchasing bureau purchases have been confined within the limits of absolute necessity and that the accumulation of stores incident to former years has ceased.

In the judgment of the Paymaster-General an aggregate appropriation for supplies for the Navy would enable a more literal compliance with the law as it now exists; would materially simplify the accounts; would secure speedier execution of orders, and result in still greater economy in the purchase of supplies.

Owing to improvements in the system of bookkeeping introduced in the past year, both in the office of the Paymaster-General and in the offices of the general storekeepers, the Bureau is enabled to furnish fuller information in regard to supplies and disbursements than has heretofore been possible.

Prior to last January supplies in charge of general storekeepers were carried upon sets of books for each bureau, arranged under classified schedules embracing seventy-one classes, the balance sheets rendered covering only total values of stores of the bureau to which they appertained, making it impossible for this Bureau to determine how much of the several amounts pertained to "General Supplies," how much to "Unserviceable Stores," and how much to supplies purchased for the "Increase of the Navy." Furthermore, the reports submitted to the Bureau were vague and indefinite as to quantities, sizes, and other data necessary to the utilizing of stores by transfer from one station to another.

Under the system of bookkeeping recently inaugurated supplies in charge of general storekeepers are now carried under thirty-two classes, in four separate accounts, viz: Account A, General Supplies; Account B, Increase of Navy; Account C, Reserved Stores; Account D, Condemned Stores.

Appendix F shows the balance on hand at the close of the fiscal year under each of these accounts.

In conformity with the act of June 30, 1890, above cited, careful inventories have been taken at the several yards and stations and the supplies found to be on hand have been entered, with their prices, upon the books, thus enabling general storekeepers to determine *from their books* what is in store, and to render to the Paymaster-General reports showing, in detail, the several kinds and sizes of the articles on hand.

The information thus obtained is entered at the Bureau into great

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stock ledgers, as well as upon cards (now more than 32,000 in number), arranged alphabetically, and covering every article, in minute detail as to kind and size, so that it is possible to determine in the Bureau at what point a particular article called for is in stock and whence it can most readily be furnished.

The data necessary to the constant correction of the cards is taken from daily reports of expenditures received from general storekeepers and from daily reports rendered by the boards of inspection at the several yards. Information as to orders placed under approved requisitions is received daily, in reports from purchasing pay officers. Prompt notice of shipments from station to station is also received, a report being sent to the Bureau by the officer making the shipment as well as by the officer receiving it.

In the matter of "arranging, classifying, consolidating, and cataloguing" supplies, much yet remains to be done. The Bureau has estimated for an additional appropriation of $10,000 for this purpose.

Constant progress is being made in the development and practicable adaptation of the system now in operation governing the purchase and custody of supplies.

With the view to securing prompt and satisfactory deliveries under contract and open purchase orders, general storekeepers are required to make daily reports to purchasing pay officers of articles due and not delivered under orders placed by them, as well as to submit frequent reports to the Paymaster-General concerning non-delivery of articles due under contracts.

By this means both purchasing pay officers and the Bureau are enabled to follow orders to a satisfactory completion; or in case of unnecessary delay on the part of contractors, to cancel them and make purchase elsewhere for their account.

Frequent instances have occurred in the past year where the excess in cost of articles thus purchased has been collected by the Bureau.

Notwithstanding all that has been accomplished thus far, much yet remains to be done in order to perfect the system, especially in the speedy filling of requisitions and in securing more prompt delivery of supplies.

Much of the delay complained of, however, is due rather to the requirements of the law governing the purchase of supplies than to the system itself.

The subject requires careful thought and patient effort. The Bureau is directing its best energies to it, and hopes before long to reach satisfactory results through the introduction of simpler forms and less complicated methods.

The wisdom of concentrating in one bureau all the accounts of the Navy is evidenced in the fact that the Department is now enabled to avail itself speedily of information and data heretofore altogether unattainable, or only procurable after great labor, by compilation of statistics gathered from each separate bureau. By means of a comprehensive system of double-entry bookkeeping, covering accounts with each ship in the Navy, with every navy-yard and station, including separate accounts with the machinery plant and the manufacturing departments of each yard and station, this Bureau is enabled to follow, in minute detail, all expenditures of money and material so as to be able to give the value of all property comprising the naval establishment, and the expense of maintaining it; to say what each ship in the new Navy has cost, and to give the running expense of every vessel in commission.

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A new feature of the annual report will be found in Appendix H, where is given, in concise form, the value of "real estate and chattels" and of the "machinery plant" at the several yards and stations; the total value of the former being $46,788,841.42, and of the latter $3,773,655.45.

Of the sixty-nine naval appropriations for 1892, fifty-five are carried on the books of this Bureau, and their existing condition can at all times be readily ascertained. These appropriations, together with the balances brought forward from the preceding year, aggregated on the first day of July, 1891, $39,553,512.75.

Monthly balance sheets under the various appropriations are regularly prepared for the information of the Department and the bureaus, indicating the limit of possible liabilities which may be incurred.

If all naval appropriations were carried on the books of the Paymaster-General, he would then be in possession of data that would enable him to report each year the exact cost of maintaining the Navy.

The foregoing statements show the character of the work devolving upon the Bureau of Provisions and Clothing, and indicate very clearly that its title is a misnomer, conveying an erroneous impression as to the nature of its functions and the scope of its duties. I recommend that its name be changed to "Bureau of Supplies and Accounts."

Last year I recommended an increase of clerical force and submitted an estimate for seven additional clerks. Congress, however, failed to make the necessary appropriation. The need of an increase in the clerical force of the Bureau is even greater now than it was a year ago; but, bearing in mind the failure to secure an appropriation for the additional clerks asked for then, I have estimated this year for but two, in the hope that this small increase, so urgently needed, will not be refused.

The work of the Bureau has greatly increased since last year. Contracts have nearly doubled in number, resulting in a corresponding increase in the number of vouchers, each one of which requires and receives most careful and thorough examination. The correspondence of the Bureau is greater by 30 per cent than it was a year ago.

I again earnestly recommend an increase in the salary of the chief clerk. The duties devolving upon him are of an exceedingly onerous nature, demanding great ability, a wide range of information, and a thorough knowledge of the Bureau's work in all its details. The present salary, which is only equal to that of a clerk of the fourth class, was fixed by law when the Bureau had charge of provisions and clothing only. Under the present system the chief clerk is charged, under the direction of the Paymaster-General, with the control of a large force of clerks and with the responsibility of superintending the important and greatly enlarged work of this, the financial, bureau of the Department.

The salary recommended in my last report, *i. e.*, $2,500, is again urged for consideration.

In the annual report for 1887 the following statement occurs:

"Section 4 of the act of March 2, 1867, provided that "the storekeeper at the Naval Academy shall be detailed from the paymaster's corps, and shall have authority, with the approval of the Secretary of the Navy, to procure clothing and other necessaries for the midshipmen and cadet engineers, now naval cadets, in the same manner as supplies are furnished to the Navy."

Under the direction of a former Secretary of the Navy, the sum of $24,500 was transferred from pay of the Navy to the cadets' storekeeper, to constitute his capital to transact the various duties devolved upon him. This sum has remained, without change, in the custody of the cadets' storekeeper, and used as indicated above.

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The act of June 19, 1878, prohibits the use of any money appropriated for "pay of the Navy," except for the pay of the officers and men of the Navy.

I repeat the recommendation then made, that Congress be requested "to legalize the present use of this sum by transferring $24,500 from 'Pay of the Navy' to a fund to be designated 'Clothing and other necessaries for naval cadets.'"

During the past year the pay corps of the Navy has been reduced to the number in each grade fixed by the act of August 5, 1882.

In view of the embarrassment experienced from the lack of a sufficient number of passed assistant and assistant paymasters for necessary assignments to duty, I recommend that an addition of five be made to the number now allowed in each of these grades.

I have the honor to be, very respectfully, your obedient servant,

EDWIN STEWART,
Paymaster-General, U. S. Navy.

The SECRETARY OF THE NAVY.

APPENDIX A.

Appropriation account for the fiscal year 1891.

RECEIPTS.

Balance July 1, 1890		$19,582,361.47
Appropriations:		
Act of June 30, 1890	$23,062,920.53	
Indefinite appropriations for 1890	111,060.20	
Deficiency act September 30, 1890	970,174.78	
New naval magazine	75,000.00	
Act September 29, 1890, nickel	1,000,000.00	
Deficiency act March 3, 1891	1,131,942.99	
Act March 2, 1891, made immediately available	137,000.00	
		26,488,098.45
Treasury appropriation warrants:		
Warrant No. 5	274,279.31	
Warrant No. 11	180,546.67	
Warrant No. 14	159,134.89	
Warrant No. 18	646,626.93	
Warrant No. 19	46,250.81	
		1,306,838.61
Repayments by deposits	233,810.61	
Repayments by transfers	38,889.95	
		272,700.56
Adjustments credited by Fourth Auditor		6,474,461.52
Drawn for indefinite appropriations during 1891		216,714.33
Total receipts		54,341,174.94

DISBURSEMENTS.

General account of advances, balances due June 30, 1890		516,687.70
Indefinite appropriations, balances due June 30, 1890		111,060.20
Carried to the surplus fund		304,152.43
Interior Department, to pay Navy pensions		136,885.00
Advances to pay officers:		
Navy pay agents, to pay vouchers	10,670,856.08	
Pay officers of yards and stations, to pay for labor	4,976,847.55	
Secretary's office, to pay officers at yards and stations and navy pay agencies, for pay of the navy, etc	4,252,086.11	
Pay officers of ship in commission	4,392,553.37	
Seligman Brothers, navy agents, London	500,000.00	
Pay officers of Marine Corps	729,521.93	
Commission on dry docks	14,000.00	
Total advances		25,535,865.04
Direct payments by Secretary's office		259,038.24
Adjustments debited by Fourth Auditor		7,066,155.26
Balance June 30, 1891, carried forward to next year:		
Appropriations		20,259,110.08
General account of advances		152,220.92
Total		54,341,174.94

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General financial account for the fiscal year 1891.

STATEMENT FOR JUNE 30, 1890.

Balance on hand as follows:		
Appropriations		$19,582,261.47
Navy pay agents	$75,300.54	
Navy-yard paymasters	92,586.66	
Pay officers from advances by Secretary's office	135,139.70	
		303,025.90
Seligman Brothers, navy agents, London		489,832.20
Pay officers of ships in commission		566,240.58
Marine Corps, pay officers		13,179.56
In transit at this date		304,671.70
Total		21,259,321.59
Liabilities:		
General account of advances	516,687.70	
Indefinite appropriations, amount drawn in 1890	111,060.20	
Vouchers covered by remittances not reported paid	75,606.33	
		703,254.23
Balance June 30, 1890		20,555,967.27

Receipts for the fiscal year 1891.

Balance, July 1, 1890		$20,555,967.27
Appropriations by Congress 1891		26,488,096.45
Sales of condemned supplies		117,063.37
Interest on Navy pension fund		630,000.00
Naval hospital fund:		
Covered into the Treasury	$96,583.90	
Awaiting appropriation warrant	5,085.95	
		101,669.85
Clothing and small stores fund		403,077.41
Checkages by Auditor and paid		677.88
Receipts not classified		29,746.97
Premiums on remittances and interest received		31,614.92
Deposits by crews at 4 per cent. interest		128,960.34
Cash from sales of supplies on board of ships		13,782.52
Effects of deceased men and deserters		3,223.43
Refunded by discharged seamen		796.66
Total receipts		48,496,921.06

Expenditures for the fiscal year 1891.

Labor rolls at navy-yards and stations		$4,917,836.94
Labor performed in June, 1890		278.57
Money vouchers, payments on contracts, services, etc		6,805,756.54
Supplies in store received by the general storekeepers at navy-yards		3,960,262.45
Payments for pay of the Navy etc., from advances by Secretary's office		4,136,114.37
Pay rolls of ships in commission		3,569,742.83
Commuted rations:		
On ships in commission	$658,459.70	
At shore stations	31,582.80	
		690,042.50
Public bills, ships in commission		602,735.46
Pay officers, Marine Corps		694,517.77
Direct payments made by Secretary's office		146,416.83
Payments by Secretary of the Navy by Seligman Brothers		69,388.04
Expenses navy agency at London		4,655.97
Expenses of naval attachés abroad		27,499.47
Expended by commission on dry docks		10,354.85
Claims certified by Fourth Auditor paid by pay officers of ships		12,065.57
Honorable discharges to seamen		22,102.09
Discount on bills of exchange, etc		32,891.71
Expenses of sales of condemned stores		4,799.89
Adjustment by Fourth Auditor		589,303.21
		$26,297,958.56
To surplus fund Treasury Department	304,152.43	
Interior Department, for navy pensions	136,885.00	
Returned to Treasury under miscellaneous receipts	54,172.13	
		495,209.56
Total expended		26,793,168.12

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RECAPITULATION.

Total receipts for fiscal year		$48,498,921.06
Total expended for fiscal year		26,793,168.12
Balance June 30, 1890		$21,705,752.94
Balances, as follows:		
Appropriations		$20,259,110.08
General account of advances		152,220.99
Navy pay agents' balance	$27,819.80	
Navy pay agents' advances not received	79,114.50	
		106,934.30
Pay officers at shore stations, balances for advances from Secretary's office		157,537.78
Pay officers at navy-yards		117,349.83
Pay officers of ships in commission		640,492.86
Advances to pay officers of ships not received		97,000.00
Seligman Brothers, navy agents, London		232,741.61
Advances to navy agents, London, not received		250,000.00
Marine Corps, pay officers		36,857.16
Deposits in transit to be covered into the Treasury		48,908.61
Settlements to be covered into the Treasury		132,824.32
Commission on dry docks		3,442.30
Lieut. A. B. Wyckoff, in charge of navy-yard Puget Sound		500.00
		$22,235,919.84
Liabilities:		
Indefinite appropriations, 1891	$216,714.33	
Vouchers remitted for, not paid	92,806.00	
Deposits by seamen at 4 per cent	155,932.78	
Bills of exchange, not paid	60,984.79	
Advances to pay officers credited in 1891, drawn in 1892	3,729.00	
		530,166.90
Balance to next account		$21,705,752.94

EXPLANATORY STATEMENTS.

Indefinite appropriations drawn in 1891, to be covered by appropriation warrant.

Indemnity for lost clothing	$299.91
Extra pay for officers and men who served in the Mexican war	2,287.50
Relief of sufferers by wreck of U. S. steamers at Apia, Samoan Islands, act February 19, 1890	122,706.77
Relief of Admiral Carter, act September 26, 1890	6,271.23
Relief of sufferers by wreck of the U. S. S. *Huron*, gratuity act, December 11, 1877	186.00
Relief of heirs of Thomas Black (private act March 3, 1891)	4,617.60
Relief of Selina Bester, Orson H. Bester, and E. Francis Riggs (private act February 21, 1891)	21,230.67
Relief of Geo. W. Armstead and Geo. E. Weed, assignees of John Roach	59,114.65
Total	216,714.33

Deposits by seamen on 4 per cent interest.

Deposits in fiscal year 1890	92,916.32
Deposits in fiscal year 1891	124,035.34
Total deposits	216,951.66
Repayments to seamen	61,018.88
Balance	155,932.78

Refunded to the Treasury under miscellaneous receipts.

Rents at Wallabout Bay	4,369.32
Rent of wharf and naval home	275.00
Premiums on bills of exchange to London, and interest	21,486.93
Docking of ships	191.75
Premiums paid by ships' pay officers	6,966.69
Sales of condemned stores	20,882.44
Total	54,172.13

Payments for labor at navy-yards and naval stations.

Navy-yard, Portsmouth, N. H	355,001.74
Navy-yard, Boston, Mass	220,195.17
Naval torpedo station, Newport	38,984.46
Naval training station, Newport	2,243.18
Naval station, New London, Conn	10,453.88
Navy-yard, Brooklyn, N. Y	1,712,932.09
Navy-yard, League Island, Pa	145,923.59
Naval home, Philadelphia, Pa	19,988.44
Naval Academy, Annapolis, Md	54,821.31

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Navy-yard, Washington, D. C	$910,661.63
Navy-yard, Norfolk, Va	690,248.52
Naval station, Port Royal, S. C	2,883.44
Naval station, Key West, Fla	8,165.41
Navy-yard, Pensacola, Fla	31,155.39
Navy-yard, Mare Island, Cal	714,167.79
Total	4,917,826.04

General statement of appropriations available for the fiscal year 1892.

Balances on hand July 1, 1891	20,259,110.06
Balances carried to surplus fund	358,967.24
Available for fiscal year 1892	19,900,142.84
Appropriations March 2, 1891	31,333,430.78
Total for fiscal year 1892	51,233,573.62

General account of advances.

Balance July 1, 1891	152,220.99
Carried to surplus fund	477,760.28
Balance overdrawn	325,539.29

Carried to surplus fund out of balances of appropriations on hand July 1, 1891.

Pay, miscellaneous, 1887		1,012.42
Contingent, Navy, 1889		52.93
Provisions, Marine Corps, 1889		17.16
Clothing, Marine Corps, 1889		3,381.67
Fuel, Marine Corps, 1889		223.41
Military stores, Marine Corps, 1889		282.28
Transportation and recruiting, Marine Corps, 1889		371.91
Transportation and recruiting, Marine Corps, 1888		17.00
Repairs of barracks, Marine Corps, 1889		166.31
Forage, Marine Corps, 1889		86.51
Hire of quarters, Marine Corps, 1889		307.80
Contingent, Marine Corps, 1889		20.30
Pay, Naval Academy, 1889		1,180.49
Construction and repair, 1886		12.56
Pay of the Navy, ——		3,268.24
Pay of the Navy, 1887		87.01
Pay of the Marine Corps, ——		197,442.87
Pay of the Marine Corps, 1887		17,085.24
Pay of the Marine Corps, 1888		8,736.71
Expenses in connection with Arctic exploring expedition		3,833.63
Expenses of last illness, etc., of Lieut. C. R. Miles		49.00
Removal of remains, etc., of Lieut. Commander G. W. DeLong and companions		15,459.16
Relief of children of Commander O. H. Berryman and others		12,367.84
Navy-yard, Brooklyn, N. Y, 1887		.84
Contingent, Ordnance, 1887		19.22
Steam engineering, act June 14, 1878:		
Harlan, Hollingsworth & Co	$3,825.79	
Wm. Cramp & Sons	4,345.73	
		8,171.53
Repairs, Naval Academy, 1889		6.08
Heating and lighting, Naval Academy, 1889		20.27
Special course, Naval Academy, 1889		1,413.99
Library, Naval Academy, 1889		73.62
Board of Visitors, Naval Academy, 1889		26.84
Stores, Naval Academy, 1889		11.14
Materials, Naval Academy, 1889		10.53
Miscellaneous, Naval Academy, 1889		13.35
Civil establishment, Navigation, 1889		68.76
Naval War College, 1889		3,745.26
Ordnance and ordnance stores, 1889		6,083.54
Repairs, Ordnance, 1889		2,262.44
Torpedo Corps, 1889		1,466.89
Civil establishment, Ordnance, 1889		667.63
Contingent, Ordnance, 1888		1,986.69
Civil establishment, Equipment and Recruiting, 1889		227.63
Transportation and recruiting, Equipment and Recruiting, 1889		239.69
Transportation and recruiting, Equipment and Recruiting, 1888		5.00
Contingent, Equipment and Recruiting, 1888		125.67
Maintenance, Yards and Docks, 1889		754.53
Civil establishment, Yards and Docks, 1889		1,550.64
Contingent, Yards and Docks, 1889		7.39
Naval Asylum, Philadelphia, Pa., 1889		4,353.90
Repairs and preservation, navy-yards, 1889		7,672.19
Timber dry dock		.48

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Naval station and coaling depot, Port Royal, S. C.	$0.50
Naval training station, Coaster Harbor Island, R. I., 1889	487.51
Repairs, Medicine and Surgery, 1889	498.11
Contingent, Medicine and Surgery, 1889	26.10
Contingent, Medicine and Surgery, 1888	3.74
Civil establishment, Provisions and Clothing, 1889	2,611.45
Contingent, Provisions and Clothing, 1889	35.28
Contingent, Provisions and Clothing, 1888	119.94
Construction and Repair, 1889	6,792.11
Civil establishment, Construction and Repair, 1889	558.59
Steam machinery, 1889	1,398.97
Civil establishment, Steam Engineering, 1889	351.26
Contingent, Steam Engineering, 1889	54.04
Provisions, Navy, 1889	157.50
Navy-yard, Boston, dry dock	17,560.31
Navy-yard, Mare Island, Cal., 1886	17,772.75
Observations, eclipse of the sun, etc	243.82
Machinery, double-turreted monitors	3,781.92
Steel cruisers, ordnance, powder for Boston	63.38
Testing Clark's deflective turret	5.00
Total appropriations	358,967.24
General account of advances	477,760.28
Total to surplus fund	836,727.52

Balances of appropriations on hand July 1, 1891, and available for payment during the fiscal year, 1892.

ANNUAL APPROPRIATIONS.

Titles.	1891.	1890.
Pay of the Navy	$1,074,790.00	$371,176.06
Contingent, Navy	3,543.11	1,214.67
Pay, miscellaneous	6,649 62	5,502.33
Pay, Marine Corps	96,203.60	42,868.01
Provisions, Marine Corps	4,423.83	196.97
Clothing, Marine Corps	583.86	4,724.15
Fuel, Marine Corps	41.65	2,660.78
Military stores, Marine Corps	----------	609.88
Transportation and recruiting, Marine Corps	1,459.92	314.26
Repairs of barracks, Marine Corps	.88	29.04
Forage, Marine Corps	65.77	666.40
Hire of quarters, Marine Corps	.80	263.60
Contingent, Marine Corps	26.43	466.80
Pay, Naval Academy	----------	816.34
Repairs, Naval Academy	4,204.02	3.43
Heating and lighting, Naval Academy	2,218.82	41.73
Contingent, Naval Academy	6,158.59	481.49
Furniture for naval cadets, etc	1,641.00	.08
Special course, Naval Academy	3,299 38	61.59
Contingent, Yards and Docks	2,605.62	10,420.21
Maintenance, Yards and Docks	28,118 68	4,402.48
Repairs and preservation, navy-yards	14,320.42	5,297.29
Civil establishment, Yards and Docks	1,109.92	290.35
Naval Home, Philadelphia, Pa	15,637.23	698.44
Equipment of vessels	233,937.73	75,183.87
Contingent, equipment	3,478.86	2,036.30
Civil establishment, equipment	.09	.23
Naval training station	4,170 33	266.61
Contingent, navigation	11,967.58	69.42
Civil establishment, navigation	----------	287.32
Naval War College and Training School	9.902.15	----------
Transportation and recruiting, Navy	4,319.65	814.06
Gunnery exercises	1,884.64	----------
Ordnance and Ordnance Stores	26,815.12	7,092.34
Torpedo corps and war college	17,552.76	7,727.76
Contingent, ordnance	2,005.67	282.57
Repairs, ordnance	3,106.94	2,265.76
Civil establishment, ordnance	1,253.90	3,663 44
Construction and repair	65,938.49	18,915.66
Civil establishment, construction and repair	724.59	234.73
Steam machinery	79,200.70	8,158.61
Contingent, steam engineering	243.70	12.45
Civil establishment, steam engineering	144.78	271.42
Provisions, Navy	141,137.46	1,591.82
Contingent, provisions and clothing	2,834.35	4,705.25
Civil establishment, provisions and clothing	74.53	533.94
Medical Department	7,718.67	2,352.40
Repairs, medicine and surgery	2,865.06	562.89
Contingent, medicine and surgery	4,233.28	266.11
Total	1,892,614.18	585,501.84

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OTHER APPROPRIATIONS.

Pay of the Navy, 1889	$13,808.21
Pay, miscellaneous, 1889	473.47
Pay, Marine Corps, 1889	12,367.10
Equipment of vessels, 1889	6,623.14
Contingent, equipment and recruiting, 1889	167.43
Navigation and navigation supplies, 1889	77.68
Contingent, navigation, 1889	79.17
Contingent, ordnance, 1889	859.50
Contingent, provisions and clothing, 1889-'90	1,322.76
Pay of the Navy, 1888	1,834.06
Pay, miscellaneous, 1888	852.19
Transportation and recruiting, Marine Corps, 1888	23.00
Contingent, Marine Corps, 1888	8.12
Pay of the Navy, 1871 and 1872	.03
Contingent, Marine Corps, 1889 and prior years	209.10
Pay of the Navy, no year	500.00
Purchase of land adjacent to Naval Academy	5,804.41
Buildings and grounds, Naval Academy	60,300.00
Furnishing gymnasium, Naval Academy, 1891-'92	5,000.00
Naval station, Pago Pago, Samoa	62,872.12
Increase of the Navy, Nickel	945,085.57
Vessels and monitors, act August 3, 1886	116,770.28
Increase of the Navy:	
Vessels for coast and harbor defense	47,385.17
Monitors and vessels, authorized March 3, 1885, and August 3, 1886	219,417.43
Steel practice vessel	197,039.28
Construction and machinery	2,441,003.06
Marine Barracks, Sitka, Alaska	5,000.00
Naval station and coaling depot, Isthmus of Panama	200,000.00
Navy-yard, Brooklyn, N. Y	55,255.72
Navy-yard, Norfolk, Va	33,828.95
Launching ways and ships, New York and Norfolk navy-yards	13,721.81
Increase of the Navy, traveling cranes	99,571.58
Commissions on dry docks	484.27
Commission on new navy-yards and dry docks	3,340.91
Navy-yard, League Island, Pa	189,111.65
Navy-yard, League Island, timber dry dock	1,167.57
Navy-yard, Washington, D. C	9,967.47
Navy-yard, Mare Island, Cal	67,551.74
Adjustable stern dock	3,000.00
Electric lighting of navy-yards	42,859.15
Navy-yard, Boston, Mass	48,669.87
Naval station, Key West, Fla	735.00
Navy-yard, Portsmouth, N. H	21,050.43
Construction of dock, Port Royal, S. C	193,833.97
Electric welding machine	12,000.00
New naval observatory	104,972.72
Increase of the Navy, armament	128,997.97
Steel cruisers, ordnance	8,299.97
Increase of the Navy, armor and armament	5,210,486.86
Purchase of armor plates	22,367.89
New naval magazine	74,906.00
Submarine gun	13,125.00
Testing torpedoes	17,670.62
Naval proving ground	18,905.78
Torpedoes	33,100.90
Breech-loading rifled cannon	1,415.04
Testing American armor	6,069.19
Increase Navy, armor and gun steel	3,478,282.08
Wire-wound gun	2,612.22
Sale of small arms	167.84
Ordnance material, proceeds of sales	40,729.42
Increase of the Navy, gun plant, navy-yard, Washington, D. C	483,978.51
Building, torpedo station and war college	100,000.00
Ammunition for the *Vesuvius*	12,000.00
Modern guns and ammunition	64,006.27
Rapid twist guns and reinforce cartridges	50,000.00
Ocean and lake surveys	3,764.53
Outfits for naval apprentices	13,538.52
Ocean surveys, navigation	15.73
Publication of surveys, Mexican coast	104.41
Observations transit of Venus	373.00
Publication of surveys	2.00
Steel cruisers, construction and repair	998.32
Purchase or construction of four steam tugs	69,317.51
Construction plant, navy-yard, Portsmouth, N. H	37,381.08
Construction plant, navy-yard, Boston	32,876.05
Construction plant, navy-yard, Brooklyn, N. Y	29,190.05
Construction plant, navy-yard, League Island, Pa	45,968.51
Construction plant, navy-yard, Norfolk	22,618.10
Construction plant, navy-yard, Mare Island, Cal	48,585.23
Machinery plant, navy-yard, Boston	39,874.44
Machinery plant, navy-yard, Brooklyn, N. Y	74,899.58
Machinery plant, navy-yard, Mare Island, Cal	49,998.31
Clothing and small stores fund	370,532.05
Consolidating naval supplies	77.43
Naval hospital fund	345,955.09

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Laundry, naval hospital, New York	$579.00
Sick quarters, Portsmouth, N. H.	3,736.16
Naval hospital, Widow Island, Me	375.51
Pay, miscellaneous, certified claims	10.67
Transportation and recruiting, Marine Corps, certified claims	5.00
Bounty for destruction of enemy's vessels, certified claims	24.13
Pay of the Navy, certified claims	97,247.31
Pay of the Marine Corps, certified claims	6.81
Contingent, Naval Academy, certified claims	.18
Maintenance, yards and docks, certified claims	107.72
Destruction of clothing for sanitary reasons, certified claims	23.96
Indemnity for lost clothing, certified claims	632.33
Contingent, equipment, certified claims	9.20
Enlistment bounties to seamen, certified claims	114.54
Contingent, navigation, certified claims	.80
Contingent, ordnance, certified claims	1.14
Steam machinery, certified claims	626.57
Provisions, Navy, certified claims	1,121.05
Contingent, provisions and clothing, certified claims	32.02
Contingent, medicine and surgery, certified claims	15.45
Contingent, Marine Corps, certified claims	12.93
Bounty for destruction of enemy's vessel, act July 4, 1881	55,421.63
Mileage, Graham decision	1,204.30
Navy pension fund	630,000.00
Prize money to captors	461,244.34
Pay of the Navy, deposit fund	76,374.76
Payment of Japanese award	31,587.77
Removal of the remains of officers and others who perished by wreck at Apia, Samoa	9,601.50
Payment to owner of tugboat *A. F. Walcott*	990.00
Phineas Burgess, act June 14, 1878	12,190.00
William Cramp & Sons	12,500.04
Harlan Hollingsworth & Co	1,300.00
W. B. Reamey	400.00
J. F. Rowland	2,898.96
John Roach	18,977.48
Timber	8,377.62
	17,422,027.32
Additional balance for 1891	1,892,614.18
Additional balance for 1890	585,501.34
Total balance	19,900,142.84

Appropriations for fiscal year 1892, act of March 2, 1891.

Pay of the Navy, 1892	7,300,000.00
Pay, miscellaneous, 1892	240,000.00
Contingent, Navy, 1892	7,000.00
Pay, Marine Corps, 1892	696,296.28
Provisions, Marine Corps, 1892	69,299.64
Clothing, Marine Corps, 1892	75,000.00
Fuel, Marine Corps, 1892	23,000.00
Military stores, Marine Corps, 1892	17,010.50
Transportation and recruiting, Marine Corps, 1892	15,000.00
Repairs of barracks, Marine Corps, 1892	14,300.00
Forage, Marine Corps, 1892	3,500.00
Hire of quarters, Marine Corps, 1892	6,624.00
Contingent, Marine Corps, 1892	30,500.00
Pay, Naval Academy, 1892	104,273.45
Special course, Naval Academy, 1892	5,000.00
Repairs, Naval Academy, 1892	21,000.00
Heating and lighting Naval Academy, 1892	17,000.00
Contingent, Naval Academy, 1892	41,800.00
Transportation, recruiting, and contingent, 1892	45,000.00
Gunnery exercises, 1892	6,000.00
Ocean and lake surveys	14,000.00
Telegraphic cable surveys between San Francisco and Honolulu	25,000.00
Outfit for naval apprentices	30,000.00
Naval training station, 1892	18,000.00
Naval war college and torpedo school, 1892	10,000.00
Ordnance and ordnance stores, 1892	155,000.00
New naval magazine, Alaska	10,000.00
Naval magazine, Craney Island	15,000.00
Floating or tug cranes	30,000.00
Reserve projectiles	30,000.00
Arming and equipping naval militia	25,000.00
Repairs, ordnance, 1892	30,000.00
Torpedo station, 1892	60,000.00
Civil establishment, ordnance, 1892	26,824.00
Contingent, ordnance, 1892	8,000.00
Equipment of vessels, 1892	960,000.00
Civil establishment, equipment, 1892	19,025.00
Contingent, equipment, 1892	15,000.00
Maintenance, yards and docks, 1892	230,000.00
Civil establishment, yards and docks, 1892	59,197.37
Contingent, yards and docks, 1892	20,000.00
Repairs and preservations, navy-yards, 1892	300,000.00

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Navy-yards:	
Portsmouth, N. H	$22,287.00
Boston, Mass	17,000.00
Brooklyn, N. Y	126,885.00
League Island, Pa	127,276.62
Washington, D. C	21,788.00
Norfolk, Va	29,166.00
Mare Island, Cal	51,785.34
Construction of dock, Port Royal, S. C	150,000.00
New Naval Observatory	136,689.00
Medical Department, Medicine and Surgery, 1892	60,000.00
Repairs, Medicine and Surgery, 1892	20,000.00
Contingent, Medicine and Surgery, 1892	25,000.00
Naval-hospital fund	20,000.00
Medical Director's residence, naval hospital, Mare Island, Cal	15,500.00
Provisions, Navy, 1892	1,100,000.00
Civil establishment, Provisions and Clothing, 1892	67,581.00
Contingent, Provisions and Clothing, 1892	40,000.00
Construction and Repair, 1892	1,000,000.00
Civil establishment, Construction and Repair, 1892	19,972.50
Construction plant, navy-yard, Portsmouth, N. H	25,000.00
Steam machinery, Steam Engineering, 1892	700,000.00
Civil establishment, Steam Engineering, 1892	11,900.00
Contingent, Steam Engineering, 1892	1,000.00
Increase of the Navy, armor and armament	4,000,000.00
Increase of the Navy, Equipment	400,000.00
Increase of the Navy, Construction and Machinery	12,107,000.00
Dry dock, Puget Sound	210,000.00
Total	31,333,430.78

Statement of payments through the Paymaster-General's office on contract, open purchase, and open-contract vouchers.

Bureau.	Contract.	Open purchase.	Open contract.	Total.
Yards and Docks	$541,107.86	$86,953.00	$30,372.15	$658,433.01
Equipment	436,257.44	178,888.89	37,436.47	652,582.80
Navigation	25,085.72	43,143.59	33,175.04	101,404.35
Ordnance	697,066.22	789,518.20	46,621.84	1,533,206.26
Construction and Repair	851,510.72	143,869.68	41,342.08	1,036,722.48
Steam Engineering	268,272.15	152,392.08	5,980.21	426,644.44
Provisions and Clothing	302,396.39	70,780.57	13,849.31	387,026.27
Medicine and Surgery	105,482.37	44,260.03	21,855.83	171,598.23
Secretary's office	5,695,206.09	42,351.22	4,395.85	5,741,953.16
Total	8,922,384.96	1,552,157.26	235,028.78	10,709,571.00

APPENDIX B.

Statements of receipts and expenditures of provisions, fiscal year 1891.

Balances, July 1, 1890:		
On hand at navy-yards and stations	$92,098.38	
On board ships in commission	85,468.00	
Provisions in transit	7,167.37	
		184,734.74
Receipts at navy-yards and stations:		
Purchases	156,325.76	
Coffee mill (roasted coffee)	23,653.59	
Gain on issue	4,183.87	
		184,163.22
Receipts on board ships:		
Purchases	126,676.34	
Gain on issues	7,553.12	
Miscellaneous	223.67	
		134,453.13
		503,351.09
Expenditures at navy-yards and stations:		
For use	378.86	
To other departments	14.57	
Condemned by survey to loss account	1,219.28	
Condemned by survey to be sold at auction	13,456.57	
Net proceeds of sales at auction	1,408.51	
Loss on sales at auction	7,144.46	
Loss on issues	223.54	
Coffee mill (green coffee)	22,653.59	
		47,499.06

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Expenditures on board ships:		
Issues to crew	$223,420.06	
Issues to marines	36,145.03	
Issues to supernumeraries (not entitled to pay)	18.60	
Water for cooking and drinking purposes	7,723.56	
To other departments	807.21	
Sales to messes for cash	9,468.94	
Condemned by survey to loss account	4,542.09	
Loss on issues	6,648.82	
Net proceds of sales at auction	273.73	
Loss on sales at auction	804.33	
		$289,852.37
Balance, July 1, 1891:		
On hand at navy-yards and stations	67,172.53	
On board ships in commission	94,978.01	
Provisions in transit	3,848.50	
		165,999.04
		503,351.09

Provisions in transit, June 30, 1891.

EXPENDITURES.

First quarter:	
From James E. Tolfree, general storekeeper, navy-yard, New York, to J. P. Loomis, U.S. S. Pensacola	$54.77
Third quarter:	
From H. T Skelding, general storekeeper, navy-yard, Pensacola, Fla., to E. N. Whitehouse, U. . . S. Chicago	25.00
Fourth quarter: S	
From A. S. Kenny, general storekeeper, navy-yard, New York, to Robert P. Lisle, U. S. R. S. St. Louis	72
To W. B. Wilcox, U. S. S. Tallapoosa	899.68
To George W. Beaman, general storekeeper, navy-yard, Mare Island, Cal	2,780.82
To James E. Tolfree, U. S. S. Minnesota	7.74
From C. S. Williams, U. S. S. Albatross, to George W. Beaman, general storekeeper, navy-yard, Mare Island, Cal	67.34
From James E. Cann, U. S. S. Enterprise, to A. S. Kenny, general storekeeper, navy-yard, New York	12.43
	3,848.50

Clothing and small stores fund account.

RECEIPTS.

Clothing and small stores fund, July 1, 1890		$1,129,931.13
Deficiency bill, act approved Sept. 30, 1890, for loss of clothing and small stores by wreck of U. S. S. Trenton and Vandalia	$17,981.81	
For clothing issued to Lieut. Commander W. H. Emery, U. S. S. Thetis, for gratuitous distribution to distressed seamen	250.63	
		18,232.44
Accounts receivable subject to settlement by the Fourth Auditor		319,906.18
Clothing and small stores purchased:		
Purchased at navy-yards and stations	236,472.06	
Purchased by pay officers on ships	3,036.67	
Pay roll at clothing factory (labor)	42,435.04	
		281,943.77
Gains:		
Gain on issues	7,205.01	
Revaluation by boards of survey	495.55	
Gain on average cost prices	2,047.91	
Gain by Fourth Auditor's settlements	19.99	
Gain by 5 per cent addition to invoice prices	13,066.22	
Expense account (refunded)	50.00	
		22,884.68
		1,772,898.20

EXPENDITURES.

Due for purchases in 1891		281,943.77
Clothing and small stores expended:		
Issued to officers, crew, and marines	279,017.36	
Clothing outfits to apprentices (1891)	31,174.93	
Sold at public auction (net value)	3,649.99	
Sold to other departments	3,017.97	
Sold for cash	2,040.58	
Deficits in pay officers' accounts	105.35	
		319,906.18

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Losses:		
Loss on issues	$2,947.88	
Loss by condemnations by surveys	2,549.91	
Loss on average cost prices	94.95	
Loss by Fourth Auditor's settlements	40.91	
Loss by sale at public auction	14,084.41	
Expense account	1,298.88	
		$21,016.94
Clothing and small store fund, July 1, 1891		1,150,031.31
		1,772,898.29

Statement of clothing and small stores fund for fiscal year ending June 30, 1891.

ASSETS AND LIABILITIES, JUNE 30, 1891.

Cash accounts:		
Balance in Treasury to credit of fund		$270,523.95
Balance in hand of paymaster at navy-yard, New York		1,904.49
		272,428.44
Stock account:		
On hand at navy-yards and stations	$350,758.08	
On hand at clothing factory	5,890.95	
On hand, condemned to be sold	35,099.70	
On board ships in commission	338,307.41	
Stores in transit	13,457.10	
Marine guard to Bering Sea expedition	37.41	
		744,150.65
Accounts receivable:		
For issues and sales awaiting adjustment by Fourth Auditor	153,992.35	
Clothing outfits issued to apprentices upon enlistment, prior to July 1, 1890 (act approved March 2, 1889)	11,621.17	
		165,613.52
Total assets		1,182,192.61

LIABILITIES.

Due for unpaid bills for stores delivered	28,177.69	
Due for reservations unpaid	3,257.53	
Due for labor at clothing factory (unpaid)	6.50	
Due for unpaid ships bills	719.58	
Total liabilities		32,161.30
Clothing and small stores fund, June 30, 1891		1,150,031.31

Statement of purchases and payments.

PURCHASES.

Due for clothing and small stores July 1, 1890:		
At navy-yards and stations	8,899.92	
On board ships	744.58	
		9,644.50
Due for purchases in fiscal year 1891:		
At navy-yards and stations	278,907.10	
On board ships	3,036.67	
		281,943.77
Total		291,588.27

PAYMENTS.

Payment made for clothing and small stores during fiscal year 1891:		
At navy-yards and stations	256,365.30	
On board ships	3,061.67	
		259,426.97
Balance due on clothing and small stores:		
At navy-yards and stations	31,441.72	
On board ships	719.58	
		32,161.30
Total		291,588.27

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Clothing and small stores in transit, June 30, 1891.

EXPENDITURES.

Third quarter:		
From A. S. Kenny, general storekeeper, navy-yard, New York—		
To W. W. Barry, U. S. S. *Essex*	$2,875.23	
Fourth quarter:		
From A. S. Kenny, general storekeeper, navy-yard, New York—		
To E. B. Rogers, U. S. S. *Kearsarge*	111.78	
To W. B. Wilcox, U. S. S. *Tallapoosa*	2,368.87	
To W. W. Barry, U. S. S. *Essex*	66.83	
To S. R. Calhoun, U. S. S. *Monongahela*	24.08	
To James H. Chapman, U. S. S. *Michigan*	765.48	
To George W. Beaman, general storekeeper, navy-yard, Mare Island, Cal	175.41	
Do	4,340.81	
Do	3,131.49	
To George E. Hendee, general storekeeper, navy-yard, League Island, Pa.	23.74	
		$13,883.72

RECEIPTS.

Fourth quarter:		
To S. L. Heap, U. S. S. *Despatch*—		
From R. W. Allen, general storekeeper, navy-yard, Washington, D. C		426.62
Balance June 30, 1891		13,457.10
		13,883.72

Statement of receipts and expenditures of contingent stores, fiscal year 1891.

Balances July 1, 1890:		
On hand at navy-yards and stations	$13,813.74	
On board ships in commission	15,092.76	
Contingent stores in transit	1,390.65	
		$30,297.15
Receipts at navy yards and stations:		
Purchases	24,477.92	
Miscellaneous	1,648.32	
Gain on issues	502.85	
		26,689.09
Receipts on board ships:		
Purchases	873.80	
Gain on issues	259.22	
		1,133.02
Total receipts		58,119.26

EXPENDITURES.

Expenditures at navy-yards and stations:		
For use	16,993.19	
To other departments	398.81	
Condemned by survey to loss account	128.18	
Condemned to be sold at auction	1,599.04	
Net proceeds of sales at auction	106.44	
Loss on sales at auction	1,843.04	
Loss on issues	48.29	
Miscellaneous	953.40	
		22,070.39
Expenditures on board ships:		
To ships' use	6,069.77	
To other departments	339.10	
Sold for cash	19.80	
Condemned by survey to loss account	22.00	
Loss on issues	4.13	
		6,354.80
Balances July 1, 1891:		
On hand at navy-yards and stations	12,727.61	
On board ships in commission	16,564.39	
Contingent stores in transit	402.07	
		29,694.07
Total expenditures		58,119.26

Contingent stores in transit, June 30, 1891.

EXPENDITURES.

Third quarter:		
From A. S. Kenny, general storekeeper, navy-yard, New York—		
To W. W. Barry, U. S. S. *Essex*	82.87	
Fourth quarter:		
From A. S. Kenny, general storekeeper, navy-yard, New York—		
To Jas. H. Chapman, U. S. S. *Michigan*	82.86	
To Robt. W. Allen, general storekeeper, navy-yard, Washington, D. C.	69.06	
From Robert W. Allen, general storekeeper, navy-yard, Washington, D. C.		
To R. T. M. Ball, U. S. S. *Palos*	32.80	
To J. S. Carpenter, U. S. S. *Albatross*	42.54	
To James H. Chapman, U. S. S. *Michigan*	42.74	
To L. G. Boggs, U. S. S. *Bennington*	49.20	
		402.07

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APPENDIX C.

Statement of expenditures at shore stations and objects to which applied.

TITLES A, B, C, AND D.—EXPENDITURES ON VESSELS.

Vessels.	Labor.	Money vouchers.	Material.	Total.
Newark	$26,691.92	$308,644.76	$2,812.59	$338,149.27
Charleston	24,146.39	392.59	4,931.66	29,470.64
Yorktown	15,868.71	1,683.02	4,560.03	22,111.76
Petrel	5,501.21	65,650.00	1,624.20	72,775.41
Baltimore	3,632.02	2,249.80	324.58	6,206.40
Vesuvius	7,931.19	97,884.54	3,073.57	108,889.30
Maine	342,714.19	271,128.68	72,523.41	686,366.28
Texas	211,618.91	171,315.00	211,790.44	594,724.35
Cushing	4,146.36	5,000.00	568.31	9,714.67
Puritan	53,641.58	.....	18,961.15	72,602.73
Monadnock	114,687.37	.....	20,036.41	134,723.78
Amphitrite	73,083.61	.....	28,605.52	101,689.13
Terror	111,768.79	46,925.00	14,973.59	173,667.33
Philadelphia	32,247.22	371,733.78	5,953.56	409,934.56
San Francisco	81,280.15	449,050.01	10,269.06	540,599.22
Concord	17,610.71	122,077.08	11,776.85	151,464.64
Bennington	12,273.80	105,364.25	625.18	118,263.23
Miantonomoh	114,489.15	.....	24,813.92	139,303.07
Monterey	16,437.89	617,397.48	.....	633,835.33
New York	15,505.65	1,253,700.00	.....	1,269,205.65
Cruiser No. 6	11,125.89	377,160.00	.....	388,285.89
Cincinnati	233,635.30	131.50	164,055.71	397,822.51
Raleigh	216,891.80	.....	213,326.98	430,218.78
Cruiser No. 9	6,538.31	248,062.50	771.14	255,371.95
Cruiser No. 10	6,220.77	248,062.50	97.55	254,380.82
Cruiser No. 11	7,699.87	272,970.00	67.41	280,737.28
Practice cruiser	3,122.26	56,250.00	56.87	59,429.13
Torpedo cruiser (act June 30, 1890)	7,076.76	.....	.....	7,076.76
Stiletto	.....	81.20	.....	81.20
Gunboat No. 5	5,008.84	114,660.00	239.71	119,908.55
Gunboat No. 6	2,889.60	114,660.00	58.80	117,607.68
Harbor-defense ram	4,897.54	.....	.....	4,857.94
Triton	926.81	.....	605.84	1,532.65
New tugs	330.99	.....	.....	330.99
Chicago	31,050.05	291.14	9,368.91	40,710.10
Lancaster	80,894.30	.....	29,482.50	110,376.80
Brooklyn	3,173.20	.....	156.76	3,329.96
Pensacola	8,708.37	54.54	5,996.17	14,759.08
Atlanta	27,919.14	682.71	10,491.92	39,093.77
Boston	41,050.80	1,202.52	9,733.26	51,986.58
Destroyer	.....	16,875.00	.....	16,875.00
Hartford	1,050.06	.....	1.50	1,051.06
Richmond	8,561.85	19.80	1,857.22	10,438.87
Omaha	437.39	170.61	.....	608.00
Ajax	59.24	.....	.....	59.24
Mahopac	.....	.....	5.03	5.03
Camanche	3,303.51	.....	934.68	4,238.19
Nantucket	905.04	.....	71.39	976.43
Passaic	.....	50.00	.....	50.00
Juniata	36.16	.....	.....	36.16
Ossipee	3,235.59	.....	33.10	3,268.69
Quinnebaug	137.40	.....	.....	137.40
Swatara	787.72	.....	10.35	798.07
Galena	12,703.09	.....	2,777.69	15,480.78
Marion	87,045.81	1.00	20,771.85	107,818.66
Mohican	5,272.01	.....	1,049.94	6,322.55
Kearsarge	1,340.48	2.50	316.48	1,659.46
Dolphin	15,231.82	5,156.00	4,109.52	24,497.34
Adams	1,503.02	.....	26.10	1,539.12
Alliance	6.72	.....	.....	6.72
Essex	362.46	.....	19.43	381.89
Enterprise	6,190.30	.....	687.80	6,878.10
Nipsic	1,431.14	.....	27.86	1,459.00
Tallapoosa	.....	.....	20.03	20.03
Thetis	11,176.01	4,044.95	3,340.60	18,562.46
Intrepid	7.04	.....	.....	7.04
Alert	17,121.45	.....	2,934.35	20,055.80
Ranger	6,015.50	.....	454.45	6,469.95
Yantic	20,614.07	.....	6,580.76	27,194.83
Alarm	5,980.03	.....	420.46	6,400.49
Michigan	3.52	.....	.....	3.52
Fern	1,397.06	.....	1,109.45	2,506.51
Despatch	523.67	202.25	277.28	1,003.20
Pinta	86.56	50.00	.....	136.56

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Statement of expenditures at shore stations and objects to which applied—Continued.

TITLES A, B, C, AND D.—EXPENDITURES ON VESSELS—Continued.

Vessels.	Labor.	Money vouchers.	Material.	Total.
Catalpa	$1,214.26		$19.72	$1,233.98
Fortune	4,200.86		893.72	5,094.58
Leyden	1,268.15		262.79	1,530.94
Mayflower	1,429.60		.24	1,429.84
Ivy	26.25			26.25
Niña	2,708.18		378.88	3,087.06
Rocket	118.24			118.24
Speedwell	337.50		8.23	345.73
Standish	10,635.26		2,624.43	13,259.69
Triana	297.48		348.52	646.00
Vermont	1,821.66	$5,653.36	452.61	7,927.63
Independence	2,914.20		648.18	3,562.38
Constitution	1,353.85		70.20	1,424.05
Monongahela	26,575.84	94.95	15,088.24	41,759.03
Constellation	7,036.09		1,542.81	8,578.90
Jamestown	1,487.49		323.14	1,810.63
Portsmouth	420.88		30.20	451.08
St. Marys	50.88			50.88
Dale	2,118.75		413.58	2,532.33
Franklin	3,959.91	300.00	1,018.41	5,278.32
Minnesota	17,329.09		5,555.29	22,884.38
Wabash	105.55		2,401.92	2,507.47
Saugus			1,004.93	1,004.93
Rescue			145.57	145.57
Monocacy	45.71			45.71
Indiana	7,503.01			7,503.01
Massachusetts	8,005.96			8,005.96
Oregon	7,556.95			7,556.95
Cruiser No. 12	10,397.86	490,500.00		500,897.86
Cruiser No. 13	3,298.80			3,298.80
Tugboat No. 1		11,677.68		11,677.68
Tugboat No. 2		11,677.68		11,677.68
Tugboat No. 3		11,677.68		11,677.68
Total	2,321,243.30	5,882,618.06	963,801.77	9,167,663.13

TITLE E.—REAL ESTATE AND CHATTELS.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy-yard, Portsmouth:				
Buildings 45 and 46	$19,895.22			$19,895.22
Water supply	2,786.70			2,786.70
Sick quarters		$29,263.84		29,263.84
Under circular No. 10			$11,936.46	11,936.46
Navy-yard, Boston:				
Buildings L, M, N, O	157.24	2,694.68	3,280.62	6,132.54
New scow	906.00			906.00
Wet dock	149.16			149.16
Building No. 43		300.00		300.00
Horses and sleigh			650.00	650.00
Under circular No. 10			3,685.08	3,685.08
Torpedo station, Newport:				
New boathouse			3,891.72	3,891.72
New shed			1,068.69	1,068.69
Surgeon's quarters			760.28	760.28
Storehouse No. 1			120.49	120.49
Inspector's quarters			167.00	167.00
Gun-cotton factory			630.31	630.31
Woolf storage battery			237.65	237.65
Naval station, New London:				
Steam launch No. 118			3,237.11	3,237.11
Horse and wagon			288.00	288.00
Fencing			256.55	256.55
Spur shores			278.19	278.19
Navy-yard, New York:				
Whitney Basin	4,631.88		1,071.23	5,703.11
Railroad	2,816.84		3,219.99	6,036.83
New sheds	3,190.58		156.93	3,347.52
Timber dry dock	14,070.76		8,735.31	22,806.07
Water system	3,922.36		5,008.60	8,930.96
Cob dock	31,106.76		47,161.51	78,268.27
Launching ways	2,852.20		2,643.10	5,495.30

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Statement of expenditures at shore stations and objects to which applied—Continued.

TITLE E.—REAL ESTATE AND CHATTELS—Continued.

Objects.	Labor.	Money hers.	Material.	Total.
Navy-yard, New York—Continued.				
Plumber shop	$963.87			$963.87
Electric lights	83.92		$114.11	198.03
Hospital laundry		$5,021.00		5,021.00
House A		329.50		329.50
Wallabout channel		18,682.48		18,682.48
Ordnance launch		4,050.00		4,050.00
Yard buildings			569.76	569.76
Boiler shop			182.70	182.70
Erecting shop			1,053.06	1,053.06
Building No. 28			2,139.67	2,139.67
Derricks			144.66	144.66
Launch boiler			72.43	72.43
Coal shed			1,362.26	1,362.26
Traveling cranes			7.42	7.42
Navy-yard, League Island:				
Protection wall	3,079.13	28,468.20		31,547.33
Retaining wall	9,102.30			9,102.30
Broad Street wharf	3,593.85	19,740.20		23,334.05
Timber dry dock		214,835.23		214,835.23
Officers' quarters		1,251.45		1,251.45
New Naval Observatory		108,038.23		108,038.23
Naval Academy, Annapolis:				
New houses		200.00		200.00
Improvement of grounds	2,018.91			2,018.91
Navy-yard, Washington:				
Railroad	1,510.36		943.85	2,454.21
North gun shop	3,095.70	31,050.00	6,342.87	40,488.57
South gun shop	5,410.12	11,385.00	798.21	17,593.33
Gun-carriage shop	811.58	4,970.00	121.65	5,903.23
Laboratory	33.16			33.16
Fuel shed	94.27			94.27
Surgeon's shed	115.89		80.94	196.83
New office	3,244.00		1,215.96	4,459.96
Building No. 7		4,781.70	43.94	4,825.64
Projectile shop			19.83	19.83
Officers' quarters			73.56	73.56
Electric light			28.97	28.97
New furniture			422.87	422.87
Miscellaneous	9,304.27		806.86	10,111.13
Under circular No. 10			535.00	535.00
Naval proving ground:				
New buildings, etc		13,964.98		13,964.98
Navy-yard, Norfolk:				
Officers' quarters	1,024.72	9,153.59		10,178.31
Water system	1,173.80			1,173.80
Railroad	1,717.19			1,717.19
Copper shop	18.88			18.88
Machine shop	1,014.23			1,014.23
Launching ways	359.00			359.00
Boiler shop	18.19			18.19
Timber dry dock	67.60			67.60
Iron and steel shop		5,478.00		5,478.00
Engineer's office			11.59	11.59
Launch No. 22			54.19	54.19
Steam barge No. 120			4,738.43	4,738.43
Naval station, Port Royal:				
Dry dock	900.00	4,474.06		5,374.06
Naval station, Key West:				
Under circular No. 10			6,610.20	6,610.20
Navy-yard, Pensacola:				
Launch No. 102			19,177.47	19,177.47
Navy-yard, Mare Island:				
Float stages	264.24			264.24
Stone dry dock	15,588.45		4,272.16	19,860.61
Iron plating shop	1,383.18		2,407.75	3,790.93
Quay wall	16,956.10		7,653.32	24,609.42
Crane scow	35.26			35.26
Roads, etc	1,083.21			1,083.21
Sectional dry dock	14,905.49			14,905.49
Cemetery road	4,681.05		166.50	4,847.55
Wharves and landings	2,968.41			2,968.41
Dynamo room			46.01	46.01
Marine barracks			3,421.12	3,421.12
Under circular No. 10			29,952.43	29,952.43
Naval magazine, Dover, N. J		34.00		34.00
Total	193,106.04	518,166.14	194,076.57	905,348.75

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Statement of expenditures at shore stations and objects to which applied—Continued.

TITLE F.—MACHINERY PLANT.

Objects.	Labor.	Money vouchers.	Material.	Total.
Navy-yard, Portsmouth:				
Bureau Yards and Docks			$63.50	$63.50
Bureau Construction and Repair	$157.64			157.64
Bureau Steam Engineering	1,089.08		14.76	1,103.84
Navy-yard, Boston:				
Bureau Equipment	943.16		290.00	1,233.16
Bureau Construction and Repair			19,771.35	19,771.35
Torpedo station, Newport			10,835.13	10,835.13
Naval station, New London:				
Bureau of Construction and Repair			2,936.16	2,936.16
Navy-yard, New York:				
Bureau of Ordnance			485.92	485.92
Bureau of Construction and Repair	11,376.72		142,868.22	154,244.94
Bureau of Steam Engineering	13,209.55		1,462.67	14,672.22
Bureau of Provisions and Clothing			700.00	700.00
Navy-yard, League Island:				
Bureau of Construction and Repair	775.28			775.28
Naval Academy, Annapolis:				
Bureau of Steam Engineering			612.41	612.41
Navy-yard, Washington:				
Bureau of Ordnance	86,167.41		311,785.15	397,952.56
Bureau of Steam Engineering			4,642.14	4,642.14
Navy-yard, Norfolk:				
Bureau of Yards and Docks			68.34	68.34
Bureau of Ordnance			325.00	325.00
Bureau of Construction and Repair	16,024.64		69,244.33	85,268.97
Bureau of Steam Engineering	63.03		343.20	406.23
Navy-yard, Mare Island:				
Bureau of Construction and Repair	4,520.06		185.76	4,705.82
Bureau of Steam Engineering	4,293.04		1,508.97	5,802.01
Total	138,619.61		568,143.01	706,762.62

TITLE G.—GENERAL MAINTENANCE.

Navy-yard, Portsmouth	135,128.74	1,355.00	39,507.17	175,990.91
Navy-yard, Boston	124,200.07	3,144.76	42,759.58	170,104.41
Naval magazine, Chelsea		3,021.69		3,021.69
Niter depot, Malden		335.00		335.00
Torpedo station, Newport	37,658.34	1,150.03	24,144.58	62,952.95
Training station, Newport	2,243.18	568.71		2,811.89
War College, Newport		30.20		30.20
Naval station, New London	10,453.88	4,305.57	15,683.73	30,443.18
Navy-yard, New York	267,589.10	7,596.55	100,889.17	376,074.82
Navy-yard, League Island	93,049.24	5,034.75	30,110.92	128,194.91
Naval home, Philadelphia	16,848.84	50,747.63		67,596.47
Naval Academy	33,410.32	1,030.55	77,995.63	112,436.50
Naval ordnance proving ground, Annapolis	18,792.08		34,987.17	53,779.25
Navy-yard, Washington	179,639.07	2,292.28	13,581.34	195,512.69
Naval magazine, Bellevue		56.00		56.00
Navy-yard, Norfolk	129,822.89	7,362.54	55,876.93	193,062.36
Naval station, Port Royal	1,983.44	970.94		2,954.38
Naval station, Key West	8,165.41	7,073.53	1,777.95	17,016.89
Navy-yard, Pensacola	30,495.39	369.35	9,969.24	40,833.98
Navy-yard, Mare Island	198,159.67	4,584.93	96,123.33	298,867.93
Naval hospital, Widows Island	1,022.50	976.43		1,998.93
Naval hospital, Portsmouth	684.32	1,927.75		2,612.07
Naval hospital, Chelsea	3,299.05	8,446.42		11,745.47
Naval hospital, New York	4,772.36	36,267.66		41,040.02
Naval laboratory, New York	3,900.00	23,733.73		27,633.73
Naval hospital, Philadelphia	3,139.60	14,310.88		17,450.48
Sick quarters, Annapolis	600.00	64.73		664.73
Naval hospital, Washington	1,800.00	4,155.33		5,955.33
Naval dispensary, Washington		2,779.27		2,779.27
Museum of hygiene, Washington	1,197.90	3,910.20		5,108.10
Naval hospital, Norfolk	3,808.53	13,059.90		16,868.43
Naval hospital, Pensacola	660.00	864.29		1,524.29
Naval hospital, Mare Island	4,523.28	16,065.01		20,588.29
Sackett's Harbor, N. Y		393.50		393.50
Erie, Pa		500.00		500.00
Hydrographic Office		5,474.03		5,474.03
Naval magazine, Craney Island		144.00		144.00
Total	1,317,047.20	234,103.14	543,406.74	2,094,557.08

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Statement of expenditures at shore stations and objects to which applied—Continued.

TITLE I.—SPECIAL DUTY.

Objects.	Labor.	Money vouchers.	Material.	Total.
Eclipse of the sun expedition		$421.03		$421.03

TITLE V.—MISCELLANEOUS.

Advertising		13,808.02		
Freight		50,284.15		
Transportation of men		23,659.90		
Telegrams		240.68		
Rent of telephones		2,581.76		
Repairing instruments, rating chronometers, etc		9,245.12		
Towing		2,815.00		
Galena wreck expenses		25,616.00		
Stationery, books, instruments, etc., furnished Bureau		17,541.66		
Stationery, drawing material furnished inspectors of new vessels		3,296.19		
Testing boiler Monterey		487.45		
Auditor's certificate, old claim		3,250.84		
Import duties		2,446.84		
Miscellaneous	$49,186.38	8,471.57	$3,647.60	
Total	49,186.38	163,755.18	3,647.60	216,589.16

TITLE Z.—CONVERSION ACCOUNT.

Bureau of Yards and Docks:				
Navy-yard, Washington	80.94		141.31	222.25
Navy-yard, Norfolk			2.62	2.62
Bureau of Equipment:				
Navy-yard, Portsmouth	13,750.56		32,635.00	46,401.56
Navy-yard, Boston	82,220.56		114,981.07	197,201.63
Navy-yard, New York	27,400.07		50,320.34	77,720.41
Navy-yard, Washington	1,432.83			1,432.83
Navy-yard, Norfolk	5,144.13		6,789.24	11,933.37
Navy-yard, Mare Island	25,899.30		87,866.85	113,766.15
Bureau of Navigation:				
Navy-yard, Washington			51.15	51.15
Bureau of Ordnance:				
Navy-yard, Portsmouth	351.90		4,445.14	4,797.04
Torpedo station	1,326.12		5,519.45	6,845.57
Navy-yard, New York	5,164.16		2,622.66	7,786.82
Navy-yard, League Island	2,273.48			2,273.48
Navy-yard, Washington	463,378.19		855,866.16	1,319,244.35
Navy-yard, Norfolk	280.54		4,199.26	4,479.80
Navy-yard, Mare Island	685.76		67,145.98	67,831.74
Bureau of Construction and Repair:				
Navy-yard, Portsmouth	44,598.70		12,903.41	57,502.11
Navy-yard, Boston	681.04			681.04
Navy-yard, New York	74,951.34		14,593.50	89,544.84
Navy-yard, Washington	2,970.55		1,320.79	4,291.34
Navy-yard, Norfolk	5,005.84		1,679.94	6,685.78
Navy-yard, Mare Island	28,933.05		21,108.98	50,042.03
Bureau of Steam Engineering:				
Navy-yard, Portsmouth	20,778.24		6,345.71	27,123.95
Navy-yard, Boston			12.42	12.42
Navy-yard, New York	18,113.97		13,365.92	31,479.89
Navy-yard, Norfolk	8,091.38		1,333.59	9,424.97
Navy-yard, Mare Island	18,661.08		6,481.27	25,142.35
Bureau of Provisions and Clothing:				
Navy-yard, New York	42,435.04		34,577.31	77,012.35
Total	894,624.77		1,346,329.07	2,240,953.84

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Statement of expenditures at shore stations and objects to which applied—Continued.

Purchases under Title X. Supplies in store, by bureaus.

Yards and Docks	$260,072.03
Equipment	480,045.38
Navigation	66,671.06
Ordnance	1,342,648.93
Construction and Repair	983,044 39
Steam Engineering	412,582.33
Provisions and Clothing	372,197.32
Secretary's office	42,000.00
	3,960,262.45

RECAPITULATION.

Objects.	Labor.	Money vouchers.	Material.	Total.
Titles A, B, C, and D.—Expenditures on ships	$2,321,243.30	*$5,882,618.06	$963,801.77	$9,167,663.13
Title E.—Real estate and chattels	193,106.04	518,166.14	194,076.57	905,348.75
Title F.—Machinery plant	138.619.61	.....	568,143.01	706,762.62
Title G.—General maintenance of yards and stations	1,317,047.20	234,103.14	543,406.74	2,094,557.08
Title I.—Special duty	.....	421.03	.....	421.03
Title N.—Models and experiments	3,998.74	6,695.00	4,599.84	15,293.58
Title V.—Miscellaneous (advertising, freight, etc)	49,186.38	163,755.18	3,647.60	216,589.16
Title Z.—Conversion account (labor and material expended in manufactures)	894,624.77	.....	1,346,329.07	2,240,953.84
Expended for specific objects (as above)	4,917,826.04	6,805,758.55	3,624,004.60	15,347,589.19
Title X.—Supplies in store	.....	3,960,262.45	.....	3,960,262.45
Total expenditures	4,917,826.04	10,766,021.00	3,624,004.60	19,307,851.64

* This includes the sum of $56.450, penalty imposed upon the contractors for the U. S. S. *Petrel*, subsequently remitted by act of Congress, September 30, 1890, and paid through the office of the Secretary of the Navy, upon settlement by the accounting officers of the Treasury.

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APPENDIX D.

Compilation showing cost of maintaining all naval vessels in commission during year ended June 30, 1891.

Vessels.	Money expended.				Value of stores expended.						Repairs while in commission.	Total.	Time in commission.
	Pay, amount of.	Rations, amount commuted.	Special credits: Honorable discharge money, outfits to apprentices, etc.	Incidental expenses: Postage, freight, pilotage, medical supplies, etc.	Bureau of Provisions and Clothing (provisions and contingent stores).	Bureau of Equipment.	Bureau of Ordnance.	Bureau of Construction and Repair.	Bureau of Steam Engineering.	Bureau of Navigation.			Mos.
Adams	$5,940.90	$730.80	.....	$12.00	$606.40	$385.68	$42.50	$152.94	$45.47	.....	$1,529.12	$9,445.81	1
Albatross (Fish Commission)	40,143.60	6,036.90	.....	19.12	1,337.76	.....	.....	.....	.....	.....	.....	47,537.38	12
Alert	45,084.05	4,918.80	.....	344.15	3,832.09	7,608.49	72.65	756.94	877.37	$3.65	20,055.80	83,553.99	8
Alliance	79,864.13	10,645.20	.....	3,741.36	6,869.67	15,593.71	2,015.31	1,241.67	1,701.16	99.45	6.72	121,778.38	12
Atlanta	125,915.34	16,230.30	$549.00	277.19	11,641.56	24,554.52	3,359.60	2,849.63	7,198.66	982.35	39,028.81	232,586.96	12
Baltimore	169,263.69	19,032.30	174.00	4,142.81	19,224.42	50,380.09	5,053.73	5,501.85	9,896.37	294.62	1,330.99	284,294.87	12
Bennington	1,034.52	202.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,297.32	1
Boston	121,264.28	15,895.20	285.23	118.73	12,040.49	27,898.31	2,859.34	2,290.19	4,990.97	498.03	51,986.58	240,127.35	12
Charleston	160,676.02	19,365.30	701.00	1,704.96	14,916.17	86,957.51	2,663.80	2,459.41	6,824.71	386.29	26,039.83	322,695.00	12
Chicago	197,490.57	32,697.80	1,679.00	1,373.07	13,458.33	28,574.78	4,873.00	4,423.50	7,662.51	773.02	40,649.20	333,654.78	12
Coast Survey vessels	220,036.97	37,559.70	.....	110.29	246.64	.....	.....	.....	.....	.....	.....	257,953.60	12
Concord	28,353.42	4,856.40	909.00	9.69	663.94	2,073.09	378.46	331.90	476.75	25.24	1,748.22	39,826.11	4
Constellation	36,265.75	6,496.50	90.00	36.03	1,868.14	2,258.15	26.61	368.77	.....	1.95	8,578.90	55,990.80	4
Cushing	9,516.41	1,446.60	.....	.....	315.54	960.30	.....	286.70	894.18	3.48	4,706.67	18,131.88	12
Dale (receiving ship)	65,050.72	10,871.90	7,273.76	311.95	318.74	3,647.36	168.79	161.23	283.98	43.00	2,532.33	90,663.76	12
Despatch	39,294.42	5,686.50	612.00	1,094.84	1,286.37	4,038.57	53.75	757.28	1,448.59	18.51	1,003.20	55,294.03	12
Dolphin	48,692.19	6,952.20	.....	605.97	1,828.93	6,289.40	1,740.58	1,006.33	2,287.57	110.52	24,497.34	94,011.03	10
Enterprise	76,861.03	6,978.50	282.00	1,194.85	9,000.34	13,412.91	1,786.68	1,905.74	2,840.61	45.19	6,878.10	121,185.95	12
Essex	81,255.15	8,769.90	153.00	1,342.31	9,506.89	7,953.18	1,653.28	736.22	1,213.57	79.56	381.89	113,044.95	12
Fern	6,069.34	999.00	.....	.....	.....	608.65	.....	47.33	270.51	.....	2,506.51	10,501.34	3
Fishhawk (Fish Commission)	31,830.49	6,720.60	.....	22.95	1.16	.....	.....	.....	.....	.....	.....	38,575.20	12
Fortune	16,100.52	2,923.50	180.00	.....	.....	3,547.89	3.70	74.10	692.40	4.87	5,094.58	28,621.56	9
Franklin (receiving ship)	80,500.73	16,712.40	2,805.00	141.49	445.14	4,887.92	429.85	597.85	906.92	88.80	5,278.32	112,154.42	12
Galena	5,485.64	725.40	.....	.....	217.14	30.58	2.32	16.82	22.94	.....	15,868.67	21,869.51	1
Independence (receiving ship)	110,170.92	27,011.10	8,168.65	225.30	250.64	7,109.14	496.74	1,205.60	177.00	6.90	3,562.38	158,384.37	12
Iroquois	86,579.67	9,450.30	387.00	1,834.45	9,173.27	13,211.23	2,362.34	852.65	1,838.37	19.90	.....	125,709.18	12
Jamestown	84,384.98	12,066.30	594.00	508.34	12,327.34	6,044.43	1,718.03	1,090.93	5.10	36.46	1,810.63	120,595.54	12
Kearsarge	86,480.47	12,074.70	261.00	833.58	7,026.82	13,378.73	2,237.04	1,068.73	1,192.81	5.41	1,656.96	126,816.25	12
Lancaster	33,944.83	3,439.20	597.00	130.20	2,580.81	1,988.47	53.21	.....	317.93	.....	113,099.41	156,121.06	3

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Marion	15,628.52	2,530.20	192.00	54.85	.....	3,632.70	.....	220.84	410.23	.....	107,818.66	130,488.00	2
Mayflower	2,248.67	608.40	.....	.....	.....	475.28	.....	20.41	26.85	.....	1,429.84	4,809.45	4
Michigan	49,599.10	11,167.80	2,837.48	1,009.43	213.09	3,396.62	466.77	813.69	475.35	21.55	3.52	70,004.40	12
Minnesota (receiving ship)	76,448.79	17,822.65	13,412.92	384.36	410.05	6,257.75	165.98	568.65	651.05	.....	22,884.38	139,006.58	12
Mohican	86,953.23	12,153.00	.....	1,393.65	8,265.64	15,528.59	2,468.20	720.19	3,651.55	321.51	6,322.55	137,778.11	12
Monitors	35,129.90	6,527.55	.....	203.60	55.10	4,673.10	485.39	725.94	216.92	33.25	6,283.82	54,334.57	12
Monocacy	70,010.81	10,755.60	1,776.00	3,793.01	4,414.23	12,098.74	1,369.83	1,601.54	1,986.89	5.49	45.71	107,855.85	12
Monongahela	31,297.05	3,632.10	175.38	336.52	3,636.90	2,493.00	181.76	339.05	31.62	.....	41,664.08	83,787.46	6
Naval Academy vessels	49,944.16	10,246.90	.....	.....	36.81	487.91	.....	1,393.09	.....	11.67	13,009.69	75,130.23	12
New Hampshire (receiving-ship)	42,476.61	14,176.20	3,851.75	179.16	125.40	2,169.25	1,291.20	666.15	238.48	.....	.....	65,174.20	12
Newark	54,330.59	6,618.30	492.00	201.39	5,001.74	5,321.62	1,423.82	882.73	1,310.76	60.73	430.20	76,073.88	5
Nipsic	23,694.89	2,894.40	390.00	120.99	2,464.86	4,789.63	327.45	488.50	1,396.11	.....	1,459.00	38,025.83	4
Omaha	122,572.18	16,458.90	993.00	4,359.08	8,110.82	30,574.24	7,524.93	3,049.28	1,852.07	382.31	608.00	196,484.81	11
Palos	31,603.46	4,136.70	744.00	2,182.40	1,369.03	5,747.80	699.42	670.54	982.97	67.15	.....	48,203.47	12
Pensacola	167,316.36	19,819.50	1,191.00	5,032.93	20,565.22	29,179.89	1,535.50	1,544.33	2,982.21	302.41	14,759.08	264,258.43	12
Petrel	61,254.00	7,282.80	.....	441.47	5,367.67	7,111.32	4,382.05	781.03	1,952.43	192.55	7,092.41	95,857.73	12
Philadelphia	162,726.76	16,715.10	1,263.00	1,485.87	15,610.47	19,248.13	6,313.35	2,659.25	2,817.49	161.55	15,951.87	244,952.84	12
Pinta	47,593.75	10,133.70	645.67	3,856.14	291.02	9,044.09	132.51	964.41	994.28	.....	136.56	73,792.13	12
Portsmouth	89,306.67	13,318.80	207.00	669.50	12,020.67	5,054.28	1,233.25	727.64	60.92	119.82	451.08	123,169.60	12
Ranger	67,087.99	7,412.70	192.00	1,367.37	6,690.44	16,275.44	1,054.22	1,746.25	1,822.31	47.97	6,469.95	110,166.64	12
Richmond (training ship)	154,647.40	47,145.50	8,124.29	740.48	4,792.58	9,750.24	2,653.99	1,212.97	8,118.88	11,473.80	10,438.87	259,108.00	12
St. Louis (receiving ship)	54,461.41	7,565.70	4,743.47	11.35	1,437.80	1,897.45	35.21	175.91	.....	.....	.....	70,328.30	12
San Francisco	103,226.02	11,578.50	75.00	903.70	11,216.50	27,395.00	3,844.23	328.67	3,476.57	298.76	747.68	163,090.63	7
Swatara	54,132.31	7,858.40	.....	2,492.14	5,216.65	6,086.92	703.95	560.73	2,637.84	57.88	798.07	80,524.89	7
Tallapoosa	73,031.17	9,358.20	411.00	3,852.46	6,166.76	8,219.32	607.63	1,230.68	2,009.04	11.19	20.03	104,917.48	12
Thetis	46,855.15	7,861.50	111.00	72.39	1,150.35	13,640.41	127.43	707.03	1,303.30	35.73	14,517.51	86,381.80	12
Vermont (receiving ship)	186,717.76	36,300.50	22,102.00	262.38	6,105.38	9,756.95	183.36	762.62	1,071.78	197.77	7,927.63	271,388.13	12
Vesuvius	36,206.00	6,902.10	108.00	1.18	27.64	1,972.91	67.71	335.82	782.24	44.59	10,978.68	57,526.87	12
Wabash (receiving ship)	88,021.10	17,377.50	7,023.89	62.85	1,944.56	4,535.32	256.75	821.26	413.77	21.20	2,507.47	122,987.67	12
Yantic	54,757.98	6,700.50	465.00	71.45	3,352.42	5,883.28	1,497.96	556.54	1,684.73	41.63	27,194.83	102,206.32	12
Yorktown	88,161.00	11,934.57	198.00	404.94	5,837.08	12,442.63	4,402.08	2,125.33	3,801.32	372.69	21,245.28	150,925.12	12
Total	4,321,151.54	672,500.37	97,425.49	56,082.67	283,481.62	618,040.10	79,487.21	59,506.38	103,226.41	17,760.40	722,499.61	7,031,161.80	.....

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APPENDIX E.

Classified abstract of balance sheets of property returns, naval establishment, at all shore stations for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$708,442.22	$37,192.23	$12,671.75	$258.82	$758,565.02
2	Apparatus and materials, electric	23,903.95	1,684.68	551.82	168.95	26,309.40
3	Bags, boxes, and chests	128,785.49	22,515.45	3,012.80	1,425.01	155,738.75
4	Blocks, etc	50,926.47	5,147.35	46.48	123.94	56,244.24
5	Bolts, rivets, nuts, lag screws, and washers	77,357.11	29,063.23	99.83	.84	106,521.01
6	Brushes and brooms	5,388.52	677.44	138.39	102.52	6,306.87
7	Building materials	92,328.44	16,909.92	34.81	23.09	109,296.26
8	Canvas, cordage, and rigging	386,630.48	17,887.99	15,796.82	25,420.85	445,736.14
9	Clothing (other than P. & C. stores)	280.64	263.49	.....	.....	544.13
10	Dry goods	37,721.92	7,863.85	2,010.95	1,626.05	49,222.77
11	Fuel	80,207.90	24,823.06	1.40	.....	105,032.36
12	Furniture and fittings, galley, kitchen, house, and table	45,283.07	1,362.29	2,198.72	1,185.43	50,029.51
13	Glass	1,931.51	304.29	19.23	.....	2,255.03
14	Hardware	369,994.66	14,609.50	2,204.18	1,348.56	388,156.90
15	Harness and horse furnishings	1,095.84	254.07	.....	.....	1,349.91
16	Instruments and apparatus, miscellaneous	28,946.60	10,178.11	361.00	207.91	45,693.62
17	Lamps and lamp fixtures	13,782.01	552.19	857.64	2,325.45	17,517.29
18	Leather and belting	24,364.42	4,020.44	18.69	9.88	28,413.43
19	Lumber and timber	1,835,622.20	103,753.31	57.18	30,036.60	1,969,469.29
20	Machinery and machine tools	379,880.32	141,435.94	5,192.08	807.46	527,315.80
21	Metals	1,011,449.35	393,899.76	148.49	7,445.52	1,412,943.12
22	Ordnance materials	7,215,049.07	844,367.64	51,023.57	13,769.16	8,124,209.44
23	Packing, rubber, and hose	59,258.13	2,936.77	1,840.62	826.90	64,862.42
24	Paints, oils, chemicals, drugs, etc	51,504.09	38,048.80	656.74	82.43	90,292.06
25	Pipe, fittings, plumbers' and gas-fitters' supplies	262,297.44	31,441.70	863.74	403.18	295,006.06
26	Provender	1,081.61	4.59	.....	306.08	1,392.28
27	Provisions (other than P. & C. stores)	320.83	116.64	.....	.....	437.47
28	Ship and boat equipment	218,426.39	19,262.57	39,010.88	7,832.45	284,532.29
29	Stationery, books, and blanks	10,934.54	2,831.10	166.07	264.06	14,195.77
30	Stoves, galleys, and fixtures	25,165.16	464.16	3,383.74	1,734.36	30,747.42
31	Tools	149,770.80	11,691.89	891.90	1,195.93	163,550.52
32	Miscellaneous stores	49,305.77	52,816.24	105.29	58.78	102,286.08
	Grand total	13,347,436.95	1,844,380.69	143,364.81	98,990.21	15,434,172.66

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Portsmouth, N. H., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains.	$45,231.41	.....	.....	$186.54	$45,417.95
2	Apparatus and materials, electric.	205.57	.....	.....	.....	205.57
3	Bags, boxes, and chests	15,100.31	.....	.....	13.54	15,113.85
4	Blocks, etc	799.73	.....	.....	.02	799.75
5	Bolts, rivets, nuts, lag screws, and washers	9,460.33	.....	.....	.12	9,460.45
6	Brushes and brooms	376.38	.....	.....	7.06	383.44
7	Building materials	3,632.94	.....	.....	.19	3,633.13
8	Canvas, cordage, and rigging	46,086.88	$6.00	.....	2,867.45	48,960.33
9	Clothing (other than P. & C. stores)	6.67	.....	.....	.....	6.67
10	Dry goods	1,524.47	.....	.....	31.68	1,556.15
11	Fuel	12,489.50	.....	.....	.....	12,489.50
12	Furniture and fittings, galley, kitchen, house, and table.....	2,692.71	.....	.....	202.31	2,895.02
13	Glass	17.52	.....	.....	.....	17.52
14	Hardware	46,933.30	.....	.....	695.94	47,629.24
15	Harness and horse furnishings ...	12.87	.....	.....	.....	12.87
16	Instruments and apparatus, miscellaneous	3,566.14	.....	.....	6.85	3,572.99
17	Lamps and lamp fixtures	1,232.03	.....	.....	114.60	1,346.63
18	Leather and belting	3,601.56	.....	.....	.....	3,601.56
19	Lumber and timber	108,672.93	.....	.....	.....	108,672.93
20	Machinery and machine tools.....	11,799.27	.....	.....	420.71	12,219.98
21	Metals	178,027.62	.....	.....	4,320.86	182,348.48
22	Ordnance materials	461,047.72	.....	.....	647.79	461,695.51
23	Packing, rubber, and hose.....	5,260.60	.....	.....	34.45	5,295.05
24	Paints, oils, chemicals, drugs, etc.	4,710.04	200.50	.....	.02	4,910.56
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	31,118.13	.....	.....	2.77	31,120.90
26	Provender	.....	.....	.....	.....	.....
27	Provisions (other than P. & C. stores)	7.27	.....	.....	.....	7.27
28	Ship and boat equipment	21,509.02	.....	.....	537.63	22,046.65
29	Stationery, books, and blanks	113.86	.....	.....	6.29	120.15
30	Stoves, galleys, and fixtures.....	1,849.56	.....	.....	1,537.21	3,386.77
31	Tools	19,114.17	.....	.....	73.54	19,187.71
32	Miscellaneous stores.....	887.84	.....	.....	.60	888.44
	Total	1,037,088.35	206.50	.....	11,708.17	1,049,003.02

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Boston, Mass, for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$29,761.69	.....	.....	.....	$29,761.69
2	Apparatus and materials, electric	270.41	.....	.....	.....	270.41
3	Bags, boxes, and chests	4,080.11	.....	.....	$2.20	4,082.31
4	Blocks, etc	3,726.18	.....	.....	.....	3,726.18
5	Bolts, rivets, nuts, lag screws, and washers	11,009.49	.....	.....	.....	11,009.49
6	Brushes and brooms	170.33	.....	.....	.....	170.33
7	Building materials	1,888.57	.....	.....	.....	1,888.57
8	Canvas, cordage, and rigging	35,935.67	.....	.....	.....	35,935.67
9	Clothing (other than P. & C. stores)	6.00	.....	.....	.....	6.00
10	Dry goods	3,591.56	.....	.....	.....	3,591.56
11	Fuel	4,692.63	.....	.....	.....	4,692.63
12	Furniture and fittings, galley, kitchen, house, and table	864.96	.....	.....	.....	864.96
13	Glass	224.49	.....	.....	.....	224.49
14	Hardware	76,469.20	.....	.....	.....	76,469.20
15	Harness and horse furnishings	15.60	.....	.....	.....	15.60
16	Instruments and apparatus, miscellaneous	3,606.70	.....	.....	2.50	3,609.20
17	Lamps and lamp fixtures	843.18	.....	.....	.....	843.18
18	Leather and belting	1,948.07	.....	.....	.....	1,948.07
19	Lumber and timber	825,635.83	.....	.....	6.50	825,642.33
20	Machinery and machine tools	36,018.94	.....	.....	.....	36,018.94
21	Metals	157,067.08	.....	.....	.....	157,067.08
22	Ordnance materials	1,337,477.83	.....	.....	111.11	1,337,588.94
23	Packing, rubber, and hose	2,430.00	.....	.....	.....	2,430.00
24	Paints, oils, chemicals, drugs, etc	5,276.30	.....	.....	.....	5,276.30
25	Pipe, fittings, plumbers' and gas fitters' supplies	13,732.61	.....	.....	.....	13,732.61
26	Provender	66.68	.....	.....	.....	66.68
27	Provisions (other than P. & C. stores)	.....	.....	.....	.....	.....
28	Ship and boat equipment	14,682.58	.....	.....	156.03	14,838.61
29	Stationery, books, and blanks	1,045.17	.....	.....	.....	1,045.17
30	Stoves, galleys, and fixtures	775.64	.....	.....	.....	775.64
31	Tools	25,040.01	.....	.....	.....	25,040.01
32	Miscellaneous stores	286.47	.....	.....	.....	286.47
	Total	2,598,640.00	.....	.....	278.34	2,598,918.34

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, New York, N. Y., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains.	$182,500.12	$5,925.06	$2,443.19	.....	$190,868.37
2	Apparatus and materials, electric.	10,430.63	682.57	260.00	$109.75	11,482.95
3	Bags, boxes, and chests	47,401.81	5,660.71	158.78	.....	53,221.30
4	Blocks, etc	17,348.61	3,639.88	.....	.....	20,988.49
5	Bolts, rivets, nuts, lag screws, and washers	21,484.44	13,979.50	.82	.....	35,464.76
6	Brushes and brooms	75.64	484.83	10.71	.....	571.18
7	Building materials	18,635.37	822.40	.....	22.90	19,480.67
8	Canvas, cordage, and rigging	133,496.91	13,064.73	1,609.01	.....	148,170.65
9	Clothing (other than P. & C. stores)	66.62	125.97	.....	.....	192.59
10	Dry goods	24,850.47	1,054.46	162.55	.....	26,067.48
11	Fuel	15,049.63	5,924.27	1.40	.....	20,975.30
12	Furniture and fittings, galley, kitchen, house, and table	25,119.49	342.11	1,561.87	96.35	27,119.82
13	Glass	96.74	126.29	.....	.....	223.03
14	Hardware	135,543.86	5,828.52	457.46	8.00	141,837.84
15	Harness and horse furnishings	724.86	.....	.....	.....	724.86
16	Instruments and apparatus, miscellaneous	3,700.08	281.75	8.57	.....	3,990.40
17	Lamps and lamp fixtures	3,613.36	238.44	235.87	.....	4,087.67
18	Leather and belting	3,589.29	150.91	4.44	.....	3,744.64
19	Lumber and timber	203,411.34	24,422.14	57.18	30,080.00	257,920.66
20	Machinery and machine tools	80,954.71	6,311.39	40.50	7.36	87,313.96
21	Metals	231,372.75	157,266.18	.....	.....	388,638.93
22	Ordnance materials	2,247,445.12	429,826.30	2,386.88	3,624.79	2,683,283.09
23	Packing, rubber, and hose	17,922.28	2,133.01	151.78	19.50	20,226.57
24	Paints, oils, chemicals, drugs, etc.	10,972.40	3,042.39	26.00	.....	14,040.79
25	Pipe fittings, plumbers' and gas fitters' supplies	81,341.37	3,494.97	.....	9.87	84,846.21
26	Provender	.....	.....	.....	.....	.....
	Provisions (other than P. & C. stores)	24.40	.....	.....	.....	24.40
28	Ship and boat equipment	105,887.49	12,659.61	593.11	54.00	119,194.21
29	Stationery, books, and blanks	2,754.68	1,081.09	21.45	1.92	3,859.14
30	Stoves, galleys, and fixtures	5,722.63	.....	1,679.08	.....	7,401.71
31	Tools	25,998.38	3,562.83	148.46	6.15	29,715.82
32	Miscellaneous stores	3,720.74	24.13	.....	.....	3,744.87
	Total	3,661,256.22	702,156.44	12,019.11	33,990.59	4,409,422.36

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, League Island, Pa., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchor, anchor gear, and chains	$12,682.37				$12,682.37
2	Apparatus and materials, electric	268.91				268.91
3	Bags, boxes, and chests	707.88	$108.89		$7.40	824.17
4	Blocks, etc	1,830.04				1,830.04
5	Bolts, rivets, nuts, lag screws, and washers	4,893.51				4,893.51
6	Brushes and brooms	324.11				324.11
7	Building material	408.15				408.15
8	Canvas, cordage, and rigging	98.70			45.00	143.70
9	Clothing (other than P. & C. stores)					
10	Dry goods	187.56			12.26	199.82
11	Fuel	1,792.53				1,792.53
12	Furniture and fittings, galley, kitchen, house, and table	298.41			4.44	302.85
13	Glass	126.80				126.80
14	Hardware	20,037.85			.40	20,038.25
15	Harness and horse furnishings	11.14				11.14
16	Instruments and apparatus, miscellaneous	1,557.95			10.00	1,567.95
17	Lamps and lamp fixtures	241.55				241.55
18	Leather and belting	102.50				102.50
19	Lumber and timber	11,556.01				11,556.01
20	Machinery and machine tools	12,287.49			5.00	12,292.49
21	Metals	46,557.43				46,557.43
22	Ordnance materials	691,577.07	50,984.53		1,275.86	743,837.46
23	Packing, rubber, and hose	1,692.07				1,692.07
24	Paints, oils, chemicals, drugs, etc	2,557.40				2,557.40
25	Pipe, fittings, plumbers' and gas-fitters' supplies	23,330.45			92.00	23,422.45
26	Provender	9.00				9.00
27	Provisions (other than P. & C. stores)	5.84				5.84
28	Ship and boat equipment	6,915.46			8.37	6,923.83
29	Stationery, books, and blanks	127.28			.50	127.78
30	Stoves, galleys, and fixtures	165.23			3.00	168.23
31	Tools	22,136.68			18.61	22,155.29
32	Miscellaneous stores	1,331.07				1,331.07
	Total	865,818.44	51,093.42		1,482.84	918,394.70

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Washington, D. C., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchor, anchor gear, and chains	$18,096.93	$55.55	.....	.....	$18,152.48
2	Apparatus and materials, electric	117.39	1,001.61	.....	.....	1,119.00
3	Bags, boxes, and chests	4,569.47	8,983.28	.....	.....	13,552.75
4	Blocks, etc	1.50	1,507.47	.....	.....	1,508.97
5	Bolts, rivets, nuts, lag screws, and washers	375.34	2,691.51	.....	.....	3,066.85
6	Brushes and brooms	204.61	.....	.....	.....	204.61
7	Building materials	1,472.28	15,975.83	.....	.....	17,448.11
8	Canvas, cordage, and rigging	646.51	4,388.45	.....	.....	5,034.96
9	Clothing (other than P. & C. stores)	37.77	137.52	.....	.....	175.29
10	Dry goods	2,019.40	6,430.25	.....	.....	8,449.65
11	Fuel	3,037.61	16,040.89	.....	.....	19,078.50
12	Furniture and fittings, galley, kitchen, house, and table	4,610.57	1,015.50	.....	.....	5,626.07
13	Glass	274.06	71.53	.....	.....	345.59
14	Hardware	1,389.20	4,790.34	.....	.....	6,179.54
15	Harness and horse furnishings	36.25	254.07	.....	.....	290.32
16	Instruments and apparatus, miscellaneous	295.45	15,896.36	.....	.....	16,191.81
17	Lamps and lamp fixtures	179.67	192.25	.....	.....	371.92
18	Leather and belting	148.07	3,601.09	.....	.....	3,749.16
19	Lumber and timber	78,934.02	49,246.88	.....	.....	128,180.90
20	Machinery and machine tools	6,322.56	132,294.11	.....	.....	138,616.67
21	Metals	112,499.26	72,715.35	.....	.....	185,214.61
22	Ordnance materials	341,742.33	261,293.82	.....	.....	603,036.15
23	Packing, rubber, and hose	591.62	787.51	.....	.....	1,379.13
24	Paints, oils, chemicals, drugs, etc	3,428.25	29,402.08	.....	.....	32,830.33
25	Pipe, fittings, plumbers' and gas fitters' supplies	937.80	17,063.38	.....	.....	18,001.18
26	Provender	713.54	4.59	.....	.....	718.13
27	Provisions (other than P. & C. stores)	63.06	116.64	.....	.....	179.70
28	Ship and boat equipment	4,354.34	6,056.96	.....	.....	10,411.30
29	Stationery, books, and blanks	725.07	1,698.44	.....	.....	2,423.51
30	Stoves, galleys, and fixtures	259.96	464.16	.....	.....	724.12
31	Tools	1,611.60	8,019.76	.....	.....	9,631.36
32	Miscellaneous stores	24,653.92	41,201.41	.....	.....	65,855.33
	Total	614,349.41	703,398.59	.....	.....	1,317,748.00

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Classified abstract of balance sheets of property returns, naval establishment at navy-yard, Norfolk, Va., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Acount B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains.	$117,962.80	$22,826.62	$2,451.51	$37.90	$143,278.83
2	Apparatus and materials, electric.	2,029.16	.....	15.60	.....	2,044.76
3	Bags, boxes, and chests.....	15,294.84	22.18	2,283.34	78.24	17,678.60
4	Blocks, etc.....	24,167.07	.....	5.00	4.55	24,176.62
5	Bolts, nuts, rivets, lag screws, and washers	10,414.51	12,256.09	80.08	.72	22,751.40
6	Brushes and brooms	1,012.55	192.61	110.07	1.02	1,316.25
7	Building materials.....	9,434.29	109.69	34.81	.....	9,578.79
8	Canvas, cordage, and rigging.....	68,985.30	174.11	3,667.73	959.34	73,786.48
9	Clothing (other than P. & C. stores).	10.58	.....	.....	.....	10.58
10	Dry goods	1,598.23	226.02	1,296.85	15.55	3,136.65
11	Fuel.....	6,959.39	2,857.90	.....	.....	9,817.29
12	Furniture and fittings, galley, kitchen, house, and table.....	5,925.87	.....	636.85	47.80	6,610.52
13	Glass	292.25	70.47	19.23	.....	381.95
14	Hardware.....	29,252.51	3,877.53	1,339.49	84.94	34,554.47
15	Harness and horse furnishings ...	254.09	.....	.....	.....	254.09
16	Instruments and apparatus, miscellaneous	7,757.02	.....	343.18	62.25	8,162.45
17	Lamps and lamp fixtures	4,047.38	.....	271.48	52.14	4,371.00
18	Leather and belting.....	7,112.34	268.44	14.25	.....	7,395.03
19	Lumber and timber	191,426.63	27,955.35	.....	.10	219,382.08
20	Machinery and machine tools.....	92,920.10	2,830.44	4,882.06	126.70	100,759.30
21	Metals.....	60,771.36	141,840.81	148.49	8,025.81	211,786.47
22	Ordnance materials	495,059.13	294.46	45,402.96	485.35	541,241.90
23	Packing, rubber, and hose	14,774.70	16.25	942.43	14.26	15,747.64
24	Paints, oils, chemicals, drugs, etc.	10,981.03	3,980.68	617.84	1.55	15,581.10
25	Pipes, fittings, plumbers' and gas fitters' supplies	52,595.60	10,488.26	822.63	32.52	63,939.01
26	Provender	.....	.....	.....	306.08	306.08
27	Provisions (other than P. & C. stores)	209.50	.....	.....	.....	209.50
28	Ship and boat equipment	26,146.67	546.00	2,463.89	235.92	29,392.48
29	Stationery, books, and blanks	1,530.10	.....	127.09	.35	1,657.54
30	Stoves, galleys, and fixtures.....	5,921.50	.....	560.60	194.15	6,676.25
31	Tools	27,172.56	77.31	743.44	102.68	28,095.99
32	Miscellaneous stores.....	3,042.32	11,224.89	99.29	58.18	14,424.68
	Total	1,301,061.38	242,136.11	69,380.19	5,928.10	1,618,505.78

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Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Pensacola, Fla., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchor, anchor gear, and chains	$9,318.76	.....	.....	.....	$9,318.76
2	Apparatus and materials, electric	691.10	.....	.....	.....	691.10
3	Bags, boxes, and chests	3,433.68	.....	.....	.....	3,433.68
4	Blocks, etc	1,703.13	.....	.....	.....	1,703.13
5	Bolts, rivets, nuts, lag screws, and washers	5,667.60	.....	.....	.....	5,667.60
6	Brushes and brooms	400.64	.....	.....	.....	400.64
7	Building materials	55,411.14	.....	.....	.....	55,411.14
8	Canvas, cordage, and rigging	1,709.75	.....	.....	.....	1,709.75
9	Clothing (other than P. & C. stores)	.....	.....	.....	.....	.....
10	Dry goods	759.07	.....	.....	.....	759.07
11	Fuel	7,883.23	.....	.....	.....	7,883.23
12	Furniture and fittings, galley, kitchen, house, and table	750.10	.....	.....	.....	750.10
13	Glass	447.40	.....	.....	.....	447.40
14	Hardware	16,840.93	.....	.....	.....	16,840.93
15	Harness and horse furnishings	15.08	.....	.....	.....	15.08
16	Instruments and apparatus, miscellaneous	1,332.71	.....	.....	.....	1,332.71
17	Lamps and lamp fixtures	328.91	.....	.....	.....	328.91
18	Leather and belting	2,798.14	.....	.....	.....	2,798.14
19	Lumber and timber	228,344.17	.....	.....	.....	228,344.17
20	Machinery and machine tools	2,752.06	.....	.....	.....	2,752.06
21	Metals	59,941.29	.....	.....	.....	59,941.29
22	Ordnance materials	262,787.48	.....	.....	.....	262,787.48
23	Packing, rubber, and hose	4,171.92	.....	.....	.....	4,171.92
24	Paints, oils, chemicals, drugs, etc	2,739.96	.....	.....	.....	2,739.96
25	Pipe, fittings, plumbers' and gas fitters' supplies	5,500.40	.....	.....	.....	5,500.40
26	Provender	170.96	.....	.....	.....	170.96
27	Provisions (other than P. & C. stores)	.....	.....	.....	.....	.....
28	Ship and boat equipment	2,796.58	.....	.....	.....	2,796.58
29	Stationery, books, and blanks	78.94	.....	.....	.....	78.94
30	Stoves, galleys, and fixtures	49.06	.....	.....	.....	49.06
31	Tools	10,024.55	.....	.....	.....	10,024.55
32	Miscellaneous stores	4,151.40	.....	.....	.....	4,151.40
	Total	698,000.14	.....	.....	.....	698,000.14

Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Mare Island, Cal., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchor, anchor gear, and chains	$255,651.04	$8,385.00	.....	$34.38	$264,070.42
2	Apparatus and materials, electric	1,607.38	.50	$241.22	59.20	1,908.30
3	Bags, boxes, and chests	32,012.33	7,276.68	.....	1,323.63	40,612.64
4	Blocks, etc	896.02	.....	.....	119.37	1,015.39
5	Bolts, rivets, nuts, lag screws, and washers	11,907.15	136.13	.....	.....	12,043.28
6	Brushes and brooms	2,228.74	.....	.....	94.44	2,323.18
7	Building materials	1,286.18	2.00	.....	.....	1,288.18
8	Canvas, cordage, and rigging	94,742.35	254.70	.....	21,549.06	116,546.11
9	Clothing, (other than P. & C. stores)	.....	.....	.....	.....	.....
10	Dry goods	2,846.32	153.12	.....	1,566.56	4,566.00
11	Fuel	15,058.36	.....	.....	.....	15,058.36
12	Furniture and fittings, galley, kitchen, house, and table	4,782.55	4.68	.....	832.28	5,619.51
13	Glass	123.79	36.00	.....	.....	159.79
14	Hardware	29,010.75	113.11	.....	559.28	29,683.14
15	Harness and horse furnishings	13.30	.....	.....	.....	13.30
16	Instruments and apparatus, miscellaneous	2,756.55	.....	.....	126.31	2,882.86
17	Lamps and lamp fixtures	2,868.48	121.50	.....	2,156.76	5,146.74
18	Leather and belting	4,710.03	.....	.....	9.88	4,719.91

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Classified abstract of balance sheets of property returns, naval establishments, at navy-yard, Mare Island, Cal., for the year ended June 30, 1891—Continued.

ON HAND JUNE 30, 1891—Continued.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
19	Lumber and timber	$187,174.29	$2,128.94			$189,303.23
20	Machinery and machine tools	135,487.85			$247.69	135,735.54
21	Metals	149,775.58	22,077.42		22.85	171,875.85
22	Ordnance materials	1,151,155.55	85,538.60	$3,232.53	7,621.76	1,247,548.44
23	Packing, rubber, and hose	5,471.74			758.69	6,230.43
24	Paints, oils, chemicals, drugs, etc.	6,665.77	1,423.15		80.86	8,169.78
25	Pipe, fittings, plumbers' and gas fitters' supplies	50,851.07	395.09		266.02	51,512.18
26	Provender	121.43				121.43
27	Provisions (other than P. & C. stores)	10.76				10.76
28	Ship and boat equipment	33,098.71			6,840.50	39,939.21
29	Stationery, books, and blanks	4,429.60	51.57		255.00	4,736.17
30	Stoves, galleys, and fixtures	10,001.28				10,001.28
31	Tools	15,048.43	31.99		994.35	16,074.77
32	Miscellaneous stores	1,602.46	365.81			1,968.27
	Total	2,213,395.84	128,495.99	3,473.75	45,518.87	2,390,884.45

Classified abstract of balance sheets of property returns, naval establishment, at naval station, New London, Conn., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$27,104.50				$27,104.05
2	Apparatus and materials, electric					
3	Bags, boxes, and chests	51.95				51.95
4	Blocks, etc	1.50				1.50
5	Bolts, rivets, nuts, lag screws, and washers	37.37				37.37
6	Brushes and brooms	13.55				13.55
7	Building materials	6.57				6.57
8	Canvas, cordage, and rigging	1,929.00				1,929.00
9	Clothing (other than P. & C. stores)					
10	Dry goods	6.61				6.61
11	Fuel	334.07				334.07
12	Furniture and fittings, galley, kitchen, house, and table	60.35				60.35
13	Glass	15.28				15.28
14	Hardware	303.43				303.43
15	Harness and horse furnishings	.50				.50
16	Instruments and apparatus, miscellaneous	209.48				209.48
17	Lamps and lamp fixtures	31.96			$1.95	33.91
18	Leather and belting					
19	Lumber and timber	39.53				39.53
20	Machinery and machine tools	393.20				393.20
21	Metals	318.90			76.00	394.90
22	Ordnance materials	155.73			2.50	158.23
23	Packing, rubber, and hose	86.36				86.36
24	Paints, oils, chemicals, drugs, etc.	288.42				288.42
25	Pipe, fittings, plumbers' and gas fitters' supplies	118.72				118.72
26	Provender					
27	Provisions (other than P. & C. stores)					
28	Ship and boat equipment	569.09				569.09
29	Stationery, books, and blanks					
30	Stoves, galleys, and fixtures	7.82				7.82
31	Tools	130.56			.60	131.16
32	Miscellaneous stores	16.19				16.19
	Total	32,230.64			81.05	32,311.69

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Classified abstract of balance sheets of property returns, naval establishment, at Torpedo Station, Newport, R. I., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$74.79				$74.79
2	Apparatus and materials, electric	6,648.21				6,648.21
3	Bags, boxes, and chests	339.50				339.50
4	Blocks, etc					
5	Bolts, rivets, nuts, lag screws, and washers	52.13				52.13
6	Brushes and brooms	52.84				52.84
7	Building materials	35.14				35.14
8	Canvas, cordage, and rigging	351.78				351.78
9	Clothing (other than P. & C. stores)	153.00				153.00
10	Dry goods	33.85				33.85
11	Fuel	1,014.76				1,014.76
12	Furniture and fittings, galley, house, kitchen, and table	16.11				16.11
13	Glass	139.66				139.66
14	Hardware	2,561.47				2,561.47
15	Harness and horse furnishings					
16	Instruments and apparatus, miscellaneous	757.95				757.95
17	Lamps and lamp fixtures	28.60				28.60
18	Leather and belting	72.42				72.42
19	Lumber and timber	344.00				344.00
20	Machinery and machine tools	8.27				8.27
21	Metals	1,592.18				1,592.18
22	Ordnance materials	10,001.27				10,001.27
23	Packing, rubber, and hose	211.02				211.02
24	Paints, oils, chemicals, drugs, etc.	1,135.07				1,135.07
25	Pipe, fittings, plumbers' and gas fitters' supplies	549.80				549.80
26	Provender					
27	Provisions (other than P. & C. stores)					
28	Ship and boat equipment	13.31				13.31
29	Stationery, books, and blanks	100.24				100.24
30	Stoves, galleys, and fixtures					
31	Tools	352.54				352.54
32	Miscellaneous stores	61.72				61.72
	Total	26,701.63				26,701.63

Classified abstract of balance sheets of property returns, naval establishment, at Naval Academy, Annapolis, Md., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$542.74		$7,777.05		$8,319.79
2	Apparatus and materials, electric	1,590.19		35.00		1,625.19
3	Bags, boxes, and chests	5,581.19	$463.71	570.68		6,615.58
4	Blocks, etc	353.89		41.48		395.37
5	Bolts, rivets, nuts, lag screws, and washers	139.25		18.93		158.18
6	Brushes and brooms	409.67		17.61		427.28
7	Building materials	38.67				38.67
8	Canvas, cordage, and rigging	1,170.14		10,520.08		11,690.22
9	Clothing (other than P. & C. stores)					
10	Dry goods	271.96		551.55		823.51
11	Fuel	261.72				261.72
12	Furniture and fittings, galley, kitchen, house, and table	113.30			$2.25	115.55
13	Glass	173.52				173.52
14	Hardware	10,561.74		407.23		10,968.97
15	Harness and horse furnishings	12.15				12.15
16	Instruments and apparatus, miscellaneous	3,384.97		9.25		3,394.22

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Classified abstract of balance sheets of property returns, naval establishment, at Naval Academy, Annapolis, Md., for the year ending June 30, 1891—Continued.

ON HAND JUNE 30, 1891—Continued.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
17	Lamps and fixtures	$360.00		$350.29		$710.29
18	Leather and belting	40.83				40.83
19	Lumber and timber	2.64				2.64
20	Machinery and machine tools	935.87		269.52		1,205.39
21	Metals	799.24				799.24
22	Ordnance materials[1]	214,178.22	$16,429.93	1.20		230,609.35
23	Packing, rubber, and hose	577.32		746.41		1,323.73
24	Paints, oils, chemicals, drugs, etc	855.88		12.90		868.78
25	Pipe fittings, plumbers and gas-fitters' supplies	1,805.66		41.11		1,846.77
26	Provender					
27	Provisions (other than P. & C. stores)					
28	Ship and boat equipment	2,030.97		35 953.88		37,984.85
29	Stationery, books, and blanks	12.20		17.53		29.73
30	Stoves, galleys, and fixtures	378.28		1,144.06		1,522.34
31	Tools	2,416.64				2,416.64
32	Miscellaneous stores	9,128.45		6.00		9,134.45
	Total	258,127.30	16,893.64	58,491.76	$2.25	333,514.95

Classified abstract of balance sheets of property returns, naval establishment, at Naval station, Key West, Fla., for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Class.	Articles.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
1	Anchors, anchor gear, and chains	$9,515.07				$9,515.07
2	Apparatus and materials, electric	45.00				45.00
3	Bags, boxes, and chests	212.42				212.42
4	Blocks, etc	98.80				98.80
5	Bolts, rivets, nuts, lag screws, and washers	1,915.99				1,915.99
6	Brushes and brooms	119.46				119.46
7	Building materials	79.14				79.14
8	Canvas, cordage, and rigging	1,477.49				1,477.49
9	Clothing (other than P. & C. stores)					
10	Dry goods	32.40				32.40
11	Fuel	11,684.47				11,684.47
12	Furniture and fittings, galley, kitchen, house, and table	48.65				48.65
13	Glass					
14	Hardware	1,090.42				1,090.42
15	Harness and horse furnishings					
16	Instruments and apparatus, miscellaneous	21.60 6.89				21.60 6.89
17	Lamps and lamp fixtures					
18	Leather and belting	241.17				241.17
19	Lumber and timber	80.81				80.81
20	Machinery and machine tools					
21	Metals	6,726.66				6,726.66
22	Ordnance materials	2,421.62				2,421.62
23	Packing, rubber, and hose	6,068.50				6,068.50
24	Paints, oils, chemicals	1,893.57				1,893.57
25	Pipe, fittings, plumbers' and gas-fitters' supplies	415.83				415.83
26	Provender					
27	Provisions (other than P. & C. stores)					
28	Ship and boat equipment	422.17				422.17
29	Stationery, books, and blanks	17.40				17.40
30	Stoves, galleys, and fixtures	34.20				34.20
31	Tools	724.65				724.65
32	Miscellaneous stores	423.19				423.19
	Total	45,767.60				45,767.60

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APPENDIX F.

Abstract of balance sheets of property returns, naval establishment, by stations, for the year ended June 30, 1891.

ON HAND JUNE 30, 1891.

Station.	Account A, general stock.	Account B, Increase of the Navy.	Account C, reserved stores.	Account D, condemned stores.	Total.
Portsmouth	$1,037,088.35	$206.50	.....	$11,708.17	$1,049,003.02
Boston	2,598,640.00	.....	.....	278.34	2,598,918.34
New York	3,661,256.22	702,150.44	$12,019.11	33,990.59	4,409,422.36
League Island	865,818.44	51,093.42	.....	1,482.84	918,394.70
Washington	614,349.41	703,398.59	.....	.....	1,317,748.00
Norfolk	1,391,061.38	242,136.11	69,380.19	5,928.10	1,618,505.78
Pensacola	693,000.14	.....	.....	.....	693,000.14
Mare Island	2,213,395.84	128,495.99	3,473.75	45,518.87	2,390,884.45
New London	32,230.64	.....	.....	81.05	32,311.69
Newport (Torpedo station)	26,701.63	.....	.....	.....	26,701.63
Naval Academy and Proving ground	258,127.30	16,893.64	58,491.76	2.25	333,514.95
Key West	45,767.60	.....	.....	.....	45,767.60
Grand total	13,347,436.95	1,844,380.69	143,364.81	98,990.21	15,434,172.66

APPENDIX G.

Statement of value of general stores on board ships in commission during year ended June 30, 1891.

Bureaus.	Balance on hand July 1, 1890.	Receipts.	Total receipts.	Expended to use, condemned, etc.	Transferred.	Total issues.	Balance on hand June 30, 1891.
Equipment	$1,376,646.99	$1,204,808.87	$2,581,455.86	$618,040.10	$470,669.70	$1,088,709.80	$1,492,746.06
Ordnance	2,558,381.52	1,367,973.90	3,926,355.42	79,487.21	506,620.92	586,108.13	3,340,247.29
Construction	334,267.32	284,378.74	618,646.06	59,506.38	132,656.22	192,162.60	426,483.46
Steam Engineering	194,090.93	206,539.44	400,630.37	103,226.41	50,750.53	153,976.94	246,653.43
Navigation	.....	302,153.52	302,153.52	17,760.40	60,956.71	78,717.11	223,436.41
	4,463,386.76	3,365,854.47	7,829,241.23	878,020.50	1,221,654.08	2,099,674.58	5,729,566.65

Balance on hand July 1, 1890	$4,463,386.76	
Received during the year 1890–'91	3,365,854.47	
		$7,829,241.23
Expended for use, condemned, etc	878,020.50	
Expended transferred	1,221,654.08	
		2,099,674.58
Balance on hand June 30, 1891		5,729,566.65

APPENDIX H.

Statement showing the value of real estate and chattels, and machinery plant at the several navy-yards and stations, June 30, 1891.

Yards and stations.	Real estate and chattels.	Machinery plant.
Navy-yard, Portsmouth	$2,726,417.11	$215,639.69
Navy-yard, Boston	10,780,381.91	883,948.92
Torpedo station, Newport	228,497.10	52,259.48
Training station, Newport	240,881.00	6,500.00
Naval station, New London	124,999.85	6,136.16
Navy-yard, New York	12,281,134.44	677,117.21
Navy-yard, League Island	2,578,140.17	120,256.41
Naval Academy, Annapolis	597,005.94	612.41
Navy-yard, Washington	4,304,342.46	1,098,521.65
New Naval Observatory	364,704.17	.....
Naval Proving ground	22,984.98	.....
Navy-yard, Norfolk	5,533,610.40	544,639.40
Naval station, Port Royal, S. C	25,589.06	.....
Naval station, Key West	299,036.30	8,291.55
Navy-yard, Pensacola	1,885,271.07	45,459.00
Navy-yard, Mare Island	4,795,836.46	114,273.57
Total	46,788,841.42	3,773,655.45

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APPENDIX I.

Statement of public sales and report of deposits during the fiscal year 1891, on account of sales of Government property.

Date of sale.	Place of sale.	By whom deposited.	Gross receipts.	Expenses of sale.	Net proceeds.	Credited to miscellaneous receipts.
1890.						
June 2	Navy-yard, Norfolk	C. W. Slamm	$42.75	$1.67	$41.08	$41.08
June 12	do	do	640.09	59.68	580.41	187.09
June 24	Navy-yard, Washington	A. W. Bacon	21,167.10	653.36	20,513.74	473.08
July 30	Navy-yard, New York	G. H. Griffing	100.00	60.20	39.80	39.80
Aug. 25	Naval station, New London	R. T. M. Ball	90.85	9.08	81.77	81.77
Oct. 15	Navy-yard, Mare Island	H. G. Colby	4,851.96	271.23	4,580.73	1,514.95
Oct. 15	Naval Academy, Annapolis	J. D. Murray	2,628.53	136.04	2,492.49	.....
1891.						
Jan. 20	Navy-yard, Boston	C. W. Abbot	32,742.73	1,311.56	31,431.17	10,699.34
Feb. 9	Naval Observatory, Washington.	A. W. Bacon	2,903.00	63.23	2,839.77	2,839.77
Mar. 3	Navy-yard, Norfolk	C. W. Slamm	9,285.50	527.18	8,758.32	.....
Mar. 10	Navy-yard, New York	G. H. Griffing	33,105.32	1,357.36	31,747.96	4,222.58
Mar. 26	Navy-yard, Norfolk	C. W. Slamm	112.95	8.82	104.13	104.13
Apr. 15	Navy-yard, Mare Island	J. R. Stanton	358.30	29.61	328.69	328.69
Apr. 27	Navy-yard, League Island	A. D. Bache	9,034.29	310.78	8,723.51	116.16
	Total		117,063.37	4,799.80	112,263.57	20,649.04

Date of sale.	Place of sale.	By whom deposited.	Credited to special appropriations.		
			Clothing and small stores.	Ordnance and ordnance material.	Small arms.
1890.					
June 2	Navy-yard, Norfolk	C. W. Slamm	.....	.....	.....
June 12	do	do	$392.72	.....	.....
June 23	Navy-yard, Washington	A. W. Bacon	191.40	$19,779.42	$69.75
July 30	Navy-yard, New York	G. H. Griffing	.....	.....	.....
Aug. 25	Naval station, New London	R. T. M. Ball	.....	.....	.....
Oct. 15	Navy-yard, Mare Island	H. G. Colby	3,065.78	.....	.....
Oct. 15	Naval Academy, Annapolis	J. D. Murray	.....	2,492.49	.....
1891.					
Jan. 20	Navy-yard, Boston	C. W. Abbot	132.05	20,599.73	.....
Feb. 9	Naval Observatory, Washington.	A. W. Bacon	.....	.....	.....
Mar. 3	Navy-yard, Norfolk	C. W. Slamm	.....	8,664.02	94.30
Mar. 10	Navy-yard, New York	G. H. Griffing	4,348.80	23,176.58	.....
Mar. 26	Navy-yard, Norfolk	C. W. Slamm	.....	.....	.....
Apr. 15	Navy-yard, Mare Island	J. R. Stanton	.....	.....	.....
Apr. 27	Navy-yard, League Island	A. D. Bache	.....	8,607.35	.....
	Total		8,130.84	83,319.64	164.05

List of purchasers, with amount received from each.

Navy-yard, Norfolk, Va., June 2, 1890:

L. Wasserman	$42.75

Navy-yard, Norfolk, Va., June 12, 1890:

J. W. Woodman	122.96
H. Fink	86.76
Kane Brothers	64.55
J. Dreifus	105.51
W. H. Codd	19.22
J. Miano	12.60
H. Levi	138.82
J. McDoch	13.02
J. A. Codd	76.65
	640.09

Navy-yard, Washington, D. C., June 24, 1890:

M. Lissberger	10,482.96
C. J. Lawler	3,275.94
J. Dreifus	1,814.01
S. Bensinger	1,192.84

Navy-yard, Washington, D. C., June 24, 1890—Continued.

M. Hurley	$812.16
J. C. Abbey	537.67
W. B. Ferguson	497.13
D. W. Richards	429.83
F. Baunerman	314.09
L. K. Hirsch	177.30
E. L. Fitzgerrald	134.30
Purvis & Son	221.42
T. Campbell	286.19
M. Frank & Son	162.70
L. Hophenmaier	131.25
M. H. Gregory	131.86
J. McGringer	100.00
H. Baum	79.62
Walsh & Son	75.00
E. G. Wheeler	85.70
Frostburg & Murray	83.00
D. Dreyfus	50.96
H. F. Hamil	50.00
Winternite & Son	33.50

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List of purchasers, with amount received from each—Continued.

Navy-Yard, Washington, D. C., June 24, 1890—Continued.	
M. Stern	$4.70
H. Ulman	10.00
M. McHugh	8.00
M. Kane	2.88
	21,107.10
Navy-yard, New York, July 30, 1890:	
R. G. Packard	100.00
Naval station, New London, August 25, 1890:	
C. Barry	38.50
M. Burroughs	5.25
N. J. Beebe	15.15
B. C. Simmons	10.50
Charles Tenner	1.25
J. Francis	5.65
R. Bailey	8.35
D. C. Calvert	.95
N. Scofield	2.00
J. Bannester	3.25
	90.85
Navy-yard, Mare Island, Cal., Oct. 15, 1890.	
M. Smiley	901.43
M. Regan	826.05
B. Pasaalaqua	726.73
A. Malloy	650.00
W. Aden	486.49
M. Supple	331.99
J. Pantosky	267.45
M. Neylan	264.74
D. Block	109.51
M. Kedon	80.17
Hayes, Dwyer & Co	50.66
Thomas Kehoe	45.72
McCauley & Co	31.67
W. H. Hutchinson	30.28
M. Vankirk	15.00
E. Ford	11.12
B. Mighell	9.00
J. Brosnaham	7.80
E. S. Davis	4.50
M. Wilman	1.00
J. Meyer	.65
	4,851.96
Naval Academy, Annapolis, Md., Oct. 15, 1890.	
N. B. Woolford	2,628.53
Navy-yard, Boston, Mass., Jan. 20, 1891:	
Thos. Butler	5,970.83
E. H. Wilson	4,022.08
S. S. Vival	3,161.84
E. L. Fitzgerrald	3,037.68
A. Barlow	2,884.80
S. McKenna	2,747.15
A. Purves & Son	2,187.51
Nolan Bros	1,876.40
James Stewart	1,236.62
J. W. Frazier	1,217.43
M. H. Gregory	1,105.00
S. A. Comey	745.99
A. Hanson	385.68
John Mullan	368.74
Joseph Hancoch	339.00
J. Hallet & Son	257.44
F. Baunerman	273.01
S. C. Fraley	173.12
H. Lochey & Son	104.88
M. I. Ash	115.30
A. McMahon	99.88
E. H. Smith	72.67
T. Towle	77.21
B. C. Thomas	75.00
L. E. Lunt	88.60
S. Baxendale	51.45
L. F. Davis	65.41
F. D. Sullivan	61.00
C. J. Flynn	62.50
Navy-yard, Boston, Mass., Jan. 20, 1891—Continued.	
C. E. Hull	$42.00
A. D. Puffer	56.86
Jas. O'Connell	25.00
Kane Bros	32.97
J. Robertson	22.50
Geo. Whittaker	19.00
M. J. Downey	7.37
E. J. Doyle	8.91
J. P. Mullen	3.00
Michael Farrell	5.60
T. Towle	1.42
W. J. O'Neil	2.25
Deposits forfeited	151.63
	32,742.73
Naval Observatory, Washington, D. C., Feb. 9, 1891:	
John Bliss & Co	2,543.00
C. C. Hutchinson	300.00
Fauth & Co	60.00
	2,903.00
Navy-yard, Norfolk, Va., March 3, 1891:	
Purvis & Son	4,625.00
C. A. Miller	1,010.00
Thos. Butler	1,010.00
J. Dreifus	748.00
C. J. Flynn	435.00
Jas. Stewart & Co	431.00
John Mullen	267.50
E. H. Wilson & Co	406.00
J. W. Frazier	100.00
E. L. Fitzgerrald	181.50
C. Wintermitz & Son	51.00
F. Baunerman	14.00
W. H. Corey	6.50
	9,285.50
Navy-yard, New York, March 10, 1891:	
D. W. Richards & Co	12,090.76
M. H. Gregory	4,344.96
Miller, Brewer & Co	3,933.07
C. Kerrigan	3,063.53
J. W. Frazier	1,594.08
C. H. Townsend	1,147.69
L. E. Lunt	985.97
B. C. Anderson & Co	704.47
Thos. A. Green	670.63
F. Baunerman	600.77
J. J. Mahoney	566.68
Nolan Bros	508.93
D. Donovan & Son	373.83
C. J. Flynn	355.00
Jno. Dunn	316.75
J. C. Abbey	312.86
Geo. Whittaker	312.50
J. Comey	268.84
S. Hart & Co	246.17
J. W. Ellsworth	169.85
C. J. Lawless	112.92
L. F. S. Davis	107.16
T. Allen	82.64
W. G. Baunerman	67.44
E. L. Fitzgerrald	62.50
Walsh Sons & Co	48.00
S. Williams	35.00
S. C. Fraley	22.32
	33,105.32
Navy-yard, Norfolk, Va., Mar. 26, 1891:	
J. Dreifus	42.50
C. H. Hey	29.50
J. W. Woodman	16.25
W. H. Corey	11.60
M. T. Cashin	8.25
L. J. Foreman	2.75
Jesse Bain	2.10
	112.95

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List of purchasers, with amount received from each—Continued.

Navy-yard, Mare Island, Cal., Apr. 15, 1891:	
Jacob Steffin	$198.05
Jos. Feaster	65.50
W. S. Talbot	38.00
William Brandon	29.75
Thomas F. McGill	27.00
	358.30
Navy-yard, League Island, Pa., April 27, 1891:	
E. H. Wilson & Co	3,660.50
Purvis & Son	2,435.98
M. Gill, jr	1,026.00
Navy-yard, League Island, Pa., April 27, 1891—Continued.	
M. Cunliff	$621.61
F. Bannerman	565.00
D. McAvoy	383.00
Hathaway & Co	145.00
S. A. Comey	85.00
D. Donahue	51.00
M. Schroder	29.00
T. J. Scott	15.00
M. Conery	8.00
M. Cook	3.00
	9,034.29

RECAPITULATION.

New York		$33,205.32
Boston		32,742.73
Washington		24,070.10
Norfolk		10,081.29
League Island		9,034.29
Mare Island		5,210.26
Naval Academy		2,628.53
New London		90.85
Gross proceeds		117,063.37
Expenses of sales		4,799.80
Net proceeds		112,263.57
Deposited to credit—		
Miscellaneous receipts	$20,649.04	
Clothing and small stores fund	8,130.84	
Appropriation ordnance and ordnance material	83,319.64	
Appropriation small arms	164.05	
		112,263.57

APPENDIX J.

Summary of requisitions acted upon during fiscal year.

	Yards and Docks.	Equipment.	Navigation.	Ordnance.	Construction and Repair.	Steam Engineering	Provisions and Clothing	Total.
Portsmouth, N. H.	141	33	1	15	90	61	26	367
Boston, Mass.	113	222	32	41	83	45	30	566
New York, N. Y	232	504	78	313	453	530	275	2,385
League Island	81	29	18	40	70	24	28	290
Washington	137	57	38	707	92	27	101	1,159
Norfolk	91	102	28	67	342	90	40	760
Mare Island	93	125	54	46	137	173	74	701
New London	87	19	.....	3	25	12	.....	146
Torpedo station	.....	4	21	98	2	3	7	135
Training station	.....	26	60	7	13	10	8	124
Annapolis	.....	31	194	56	12	.....	14	307
Port Royal	14	2	.....	.....	.....	3	.....	19
Key West	26	13	.....	.....	6	7	13	65
Pensacola	34	6	.....	.....	25	9	.....	74
Naval Asylum	111	.....	.....	.....	.....	.....	.....	111
Miscellaneous	2	59	22	40	123	43	81	370
Bureau orders	.....	33	.....	110	98	85	10	336
Total	1,162	1,265	546	1,543	1,571	1,121	707	7,915

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APPENDIX K.

Comparative statement, 1890–1891.—Money requisitions and vouchers, and amounts advanced to pay vouchers and labor rolls.

1890.

Pertaining to Bureau of—	Requisitions.	Vouchers.	Advances to Navy pay agents.	Advance to pay labor roll.	Total.
Yards and Docks	447	1,743	$1,013,196.38	$462,475.76	
Equipment	343	1,850	441,825.03	227,395.95	
Navigation	246	987	125,721.93	55,181.66	
Ordnance	396	2,521	1,412,873.85	788,292.09	
Construction and Repair	385	1,868	749,250.94	1,825,004.62	
Steam Engineering	320	1,466	387,188.77	550,633.18	
Provisions and Clothing	308	1,375	530,135.72	215,725.83	
Medicine and Surgery	321	1,366	137,175.39	39,985.15	
Navy Department	78	129	2,920,008.46	200.00	
Total	2,844	13,305	7,717,375.47	4,164,894.24	$11,882,269.71

1891.

Yards and Docks	448	2,236	666,902.60	544,258.87	
Equipment	372	2,105	648,065.51	288,798.19	
Navigation	210	1,012	110,657.82	35,616.14	
Ordnance	417	2,461	1,393,970.32	878,465.51	
Construction and Repair	429	2,338	995,210.16	2,279,931.05	
Steam Engineering	378	1,872	410,251.96	672,270.55	
Provisions and Clothing	371	1,450	388,602.27	249,811.29	
Medicine and Surgery	339	1,361	175,551.23	32,106.88	
Navy Department	164	421	5,901,666.34		
Total	3,123	15,256	10,690,878.21	4,981,258.48	15,672,136.69
Increase over 1890	279	1,951	2,973,502.74	816,364.24	3,789,866.98

APPENDIX L.

Proposals for fresh beef, vegetables, etc., for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

1,600 pounds fresh beef:	
Clarence M. Prince*	0.07\frac{4}{5}$
James E. Chase	.07$\frac{44}{100}$
1,600 pounds fresh vegetables:	
Clarence M. Prince	.01$\frac{1}{2}$
1,600 pounds fresh vegetables—Continued.	
James E. Chase*	0.01\frac{44}{100}$
13,000 pounds fresh bread:	
Clarence M. Prince	.06
James E. Chase*	.05$\frac{44}{100}$

Proposals for fresh beef, vegetables, etc., for the navy-yard, Boston, Mass., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

40,000 pounds fresh beef:	
Chas. A. Simonds*	$0.07
Wm. J. Doran	.13
40,000 pounds fresh vegetables:	
Chas. A. Simonds*	.02
Wm. J. Doran	.03$\frac{1}{2}$
25,000 pounds fresh bread:	
Austin & Graves	.05$\frac{3}{4}$
Geo. C. Stickney*	.05$\frac{7}{8}$
Geo. A. Sanderson	.05$\frac{1}{2}$
10,000 pounds biscuit:	
Austin & Graves	0.03\frac{44}{100}$
Treadwell & Harris Baking Co*	.03$\frac{77}{100}$
Geo. C. Stickney	.04$\frac{44}{100}$
30,240 pounds ice:	
Chas. A. Simonds	.01
Boston Ice Co.*†	.0077
Drivers' Union Ice Co	.0077

Proposals for fresh beef, vegetables, etc., for the naval torpedo station, Newport, R. I., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

40,000 pounds fresh beef:	
Patrick Keefe*	0.06\frac{1}{2}$
John T. Reagan	.07
40,000 pounds fresh vegetables:	
Patrick Keefe*	.02$\frac{1}{2}$
Lawton Coggeshall	.02$\frac{1}{2}$
John T. Reagan	.02$\frac{1}{2}$
30,000 pounds fresh bread:	
Simeon Davis	0.03\frac{1}{2}$
Jeremiah J. Lynch*†	.03$\frac{1}{2}$
R. and W. Franklin	.04
200,000 gallons fresh water:	
Lawton Coggeshall*	.00$\frac{1}{2}$$\frac{3}{8}$

*Accepted. †Decide by lot.

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Proposals for fresh beef, vegetables, etc., for the navy-yard, New York, under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

165,000 pounds fresh beef:	
Michael Cloonen *	$0.05 7/16
John Hauley	.06 1/16
Patrick Morrison	.07
W. H. Belford	.08
165,000 pounds fresh vegetables:	
Michael Cloonen	.00 9/16
John Hauley *	.00 1/2
Patrick Morrison	.01
W. H. Belford	.01
150,000 pounds fresh bread:	
William Bunger *	.02 1/2
Daniel J. Stack	.02 11/100
150,000 pounds fresh bread—Continued.	
John McNamara	$0.03 1/2
William H. Belford	.04
150,000 pounds biscuit:	
Harmon R. Hetfield	.03 1/2
Treadwell & Harris Baking Co.*	.02 7/10
James D. Mason & Co	.03 11/12
Charles Goodwin & Son	.03 11/100
1,000,000 gallons fresh water:†	
Francis H. Grove	.00 1/2
W. H. Belford	.00012 1/2
103,935 pounds ice:	
W. H. Belford *	.01 1/2

Proposals for fresh beef, vegetables, etc., for the League Island navy-yard, under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

10,000 pounds fresh beef:	
L. Shuster Boraef*	$0.09 9/10
10,000 pounds fresh vegetables:	
L. Shuster Boraef*	.03 1/10
8,000 pounds fresh bread:	
John Levins*	.04
8,000 pounds fresh bread—Continued.	
John W. Errig	$0.04 1/2
William Uivel‡	
74,181 pounds ice:	
Knickerbocker Ice Co*	.00 1/10

Proposals for fresh beef, vegetaqles, etc., for the Naval Academy, Annapolis, Md., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

10,000 pounds fresh beef:	
Jackson Brewer	$0.09
John Kealy*	.07 9/10
10,000 pounds fresh vegetables:	
Jackson Brewer	.04
John Kealy*	.03 77/100
8,000 pounds fresh bread:	
Martin M. Smith*	$0.03 1/2
134,000 pounds of ice:	
Joseph S. M. Basil	.005 1/2

Proposals for fresh beef, vegetables, etc., for the navy-yard, Washington, D. C., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

8,000 pounds fresh beef:	
C. C. Carroll*	$0.03
Chas. E. Lyman	.05
8,000 pounds fresh vegetables:	
C. C. Carroll*	.01
8,000 pounds fresh vegetables—Continued.	
Chas. E. Lyman	$0.03
51,000 pounds of ice:	
Hygienic Ice Co*	.00 1/10

Proposals for fresh beef, vegetables, etc., for the navy-yard at Norfolk, Va., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

80,000 pounds fresh beef:	
Louis Myers	$0.05 9/10
Chas. E. Lyman	.04 1/2
D. S. Baum *	.04 39/100
Samuel Westheimer	.06 11/100
Louis Wasserman	.05 1/10
80,000 pounds fresh vegetables:	
Louis Meyers	.01 49/100
Chas. E. Lyman	.02
D. S. Baum*	.01 1/10
Samuel Westheimer	.01 3/10
Louis Wasserman	.01 1/10
70,000 pounds fresh bread:	
F. A. Matthews	.03 19/100
70,000 pounds fresh bread—Continued.	
Chas. C. Reid	$0.03 1/2
C. T. Cabler* §	.03 1/100
Robert L. Grubbs	.03 7/100
80,000 pounds biscuit:	
Chas. C. Reid	.03 1/2
Jas. D. Mason & Co	.03 11/100
The Treadwell & Harris Baking Co.	.03 11/100
Chas. T. Goodwin & Son	.03 11/100
60,000 pounds ice:	
John K. Gann *	.01475

Proposals for fresh beef, vegetables, etc., for the naval station, Key West, Fla., under Bureau advertisemet dated May 10, 1890; opened June 10, 1890.

7,000 pounds fresh beef:	
S. O. Johnson*	$0.12
William Walker	.14
7,000 pounds fresh vegetables:	
S. O. Johnson*	.06
William Walker	.07
5,600 pounds fresh bread:	
S. O. Johnson*	$0.19
7,300 pounds ice:	
S. O. Johnson*	.02

* Accepted. † No award. ‡ Informal. § Decided by lot.

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Proposals for fresh beef, vegetables, etc., for the navy-yard, Pensacola, Fla., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

1,000 pounds fresh beef:	
John S. Bell	$0.12½
William L. Hubbird*	.12½
1,000 pounds fresh vegetables:	
John S. Bell	.06
William L. Hubbird*	.05½
800 pounds fresh bread:	
John S. Bell	$0.06
Moses White*†	.06
44,800 pounds ice:	
E. E. Saunders & Co	.01
Cary & Co*	.00½

Proposals for fresh beef, vegetables, etc., for the navy-yard, Mare Island, Cal., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

5,000 pounds fresh beef:	
Samuel Brown*	$0.07
James McCudden	.07½
5,000 pounds fresh vegetables:	
Samuel Brown*	.01
5,000 pounds fresh bread:	
Joseph Boss*	.08
70,000 pounds biscuit:	
C. H. Bogart*	$0.06½
26,500 pounds ice:	
Henry Connelly*	.03

Proposals for stationery for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$18.00
Tissot & Schultz	23.90
Class B:	
Rowland A. Robbins	33.65
Tissot & Schultz*	32.21
Class C:	
Rowland A. Robbins*	8.10
Class D:	
Rowland A. Robbins*	12.58
Class E:	
Rowland A. Robbins*	$3.88
Class F:	
Rowland A. Robbins*	3.01
Class G:	
Rowland A. Robbins*	7.76
Class H:	
Rowland A. Robbins*	32.50

Proposals for stationery for the navy-yard, Boston, Mass., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$107.60
Tissot & Schultz	192.08
Class B:	
Rowland A. Robbins*	161.87
Tissot & Schultz	210.24
Class C:	
Rowland A. Robbins*	77.81
Woodward & Lothrop	93.24
Tissot & Schultz	104.48
Class D:	
Rowland A. Robbins	27.70
Woodward & Lothrop*	21.66
Class E:	
Rowland A. Robbins	$24.30
Woodward & Lothrop*	20.38
Class F:	
Rowland A. Robbins	16.15
Woodward & Lothrop*	5.86
Class G:	
Rowland A. Robbins	18.98
Woodward & Lothrop*	13.88
Class H:	
Rowland A. Robbins	74.62
Woodward & Lothrop*	40.80

Proposals for stationery for the navy-yard, New York, under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$260.37
Tissot & Shults	509.96
Class B:	
Marc M. Michael*	324.73
Rowland A. Robbins	457.50
Tissot & Shults	530.37
Class C:	
Marc M. Michael	101.10
Rowland A. Robbins	108.60
Woodward & Lothrop*	96.82
Tissot & Schultz	113.16
Class D:	
Marc M. Michael*	74.15
Rowland A. Robbins	133.11
Woodward & Lothrop	122.85
Class E:	
Marc M. Michael*	22.42
Class E—Continued.	
Rowland A. Robbins	$37.16
Woodward & Lothrop	35.65
Class F:	
Marc M. Michael	84.27
Rowland A. Robbins	59.73
Woodward & Lothrop	59 59
Tissot & Schultz*	45.30
Class G:	
Marc M. Michael	122.50
Rowland A. Robbins	105.65
Woodward & Lothrop*	74.85
Class H:	
Marc M. Michael	289.46
Rowland A. Robbins	344.36
Woodward & Lothrop*	244.22

*Accepted. †Decided by lot.

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Proposals for stationery for the navy-yard, League Island, Pa., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$33.30
Class B:	
Rowland A. Robbins*	84.65
Class C:	
Rowland A. Robbins	5.10
Woodward & Lothrop*	3.59
Class D:	
Rowland A. Robbins	4.84
Woodward & Lothrop*	4.17
Class E:	
Rowland A. Robbins	10.82
Woodward & Lothrop	8.42
Class F:	
Rowland A. Robbins	$8.80
Woodward & Lothrop*	8.26
Class G:	
Rowland A. Robbins	9.86
Woodward & Lothrop*	7.60
Class H:	
Rowland A. Robbins	18.16
Woodward & Lothrop*	7.75

Proposals for stationery for the navy-yard, Washington, D. C., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$355.86
Tissot & Schultz	661.87
Class B:	
Rowland A. Robbins*	791.90
Tissot & Schultz	934.63
Class C:	
Rowland A. Robbins	145.66
Woodward & Lothrop*	139.08
Tissot & Schultz	179.45
Class D:	
Rowland A. Robbins	138.26
Woodward & Lothrop*	118.79
Class E:	
Rowland A. Robbins	$83.34
Woodward & Lothrop*	82.58
Class F:	
Rowland A. Robbins	57.21
Woodward & Lothrop*	55.21
Class G:	
Rowland A. Robbins	118.14
Woodward & Lothrop*	87.93
Class H:	
Rowland A. Robbins*	545.21
Woodward & Lothrop	(†)

Proposals for stationery for the navy-yard, Norfolk, Va., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
N. P. Gatling & Co	$252.15
Rowland A. Robbins*	101.00
Tissot & Schultz	177.62
Class B:	
N. P. Gatling & Co	157.08
Rowland A. Robbins*	124.32
Tissot & Schultz	125.84
Class C:	
N. P. Gatling & Co	28.75
Rowland A. Robbins*	25.04
Woodward & Lothrop	25.88
Tissot & Schultz	31.42
Class D:	
N. P. Gatling & Co	39.31
Rowland A. Robbins	44.52
Woodward & Lothrop*	38.85
Class E:	
N. P. Gatling and Co	$23.37
Rowland A. Robbins	21.72
Woodward & Lothrop*	19.83
Class F:	
N. P. Gatling & Co	11.40
Rowland A. Robbins	17.10
Woodward & Lothrop*	6.65
Class G:	
N. P. Gatling & Co	44.85
Rowland A. Robbins	29.17
Woodward & Lothrop*	21.28
Class H:	
N. P. Gatling & Co	79.71
Rowland A. Robbins	76.12
Woodward & Lothrop*	56.11

Proposals for stationery for the naval station, New London, Conn., under Bureau advertisement May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$4.90
Class B:	
Rowland A. Robbins*	12.20
Class C:	
Rowland A. Robbins*	.92
Class E:	
Rowland A. Robbins*	$0.80
Class G:	
Rowland A. Robbins*	.60
Class H:	
Rowland A. Robbins*	5.06

Proposals for stationery for the naval training station, Newport, R. I., under Bureau advertisement dated May 10, 1890; opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$29.90
Tissot & Schultz	54.24
Class B:	
Rowland A. Robbins	38.17
Tissot & Schultz*	36.83
Class C:	
Rowland A. Robbins*	7.58
Class D:	
Rowland A. Robbins*	11.20
Class E:	
Rowland A. Robbins*	$4.78
Class F:	
Rowland A. Robbins*	3.09
Class G:	
Rowland A. Robbins*	6.23
Class H:	
Rowland A. Robbins*	23.30

*Accepted. †Informal.

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Proposals for stationery for the naval station, Key West, Fla., under Bureau advertisement dated May 10, 1890, opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$10.50
Tissot & Schultz	17.60
Class B:	
Rowland A. Robbins	41.54
Tissot & Schultz*	33.77
Class C:	
Rowland A. Robbins*	4.62
Class D:	
Rowland A. Robbins*	11.10
Class E:	
Rowland A. Robbins*	$3.00
Class F:	
Rowland A. Robbins*	9.80
Class G:	
Rowland A. Robbins*	7.24
Class H:	
Rowland A. Robbins*	33.34

Proposals for stationery for the Naval Academy, Annapolis, Md., under Bureau advertisement dated May 10, 1890, opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$6.30
Tissot & Schultz	11.02
Class B:	
Rowland A. Robbins*	35.90
Tissot & Schultz	42.04
Class D:	
Rowland A. Robbins	8.00
Woodward & Lothrop*	5.48
Class E:	
Rowland A. Robbins	$2.00
Woodward & Lothrop*	1.80
Class F:	
Rowland A. Robbins	11.52
Woodward & Lothrop*	4.20
Class H:	
Rowland A. Robbins	8.80
Woodward & Lothrop*	5.20

Proposals for stationery for permanent boards, Navy Department, Washington, D. C., under Bureau advertisement dated May 10, 1890, opened June 10, 1890.

Class A:	
Rowland A. Robbins*	$41.33
Tissot & Schultz	60.49
Class B:	
Rowland A. Robbins	56.92
Tissot & Schultz*	54.34
Class C:	
Rowland A. Robbins*	45.27
Woodward & Lothrop.†	
Class D:	
Rowland A. Robbins*	22.88
Woodward & Lothrop	23.12
Class E:	
Rowland A. Robbins	10.45
Woodward & Lothrop*	7.24
Class F:	
William H. Teepe.†	
Rowland A. Robbins*	3.50
Class G:	
Rowland A. Robbins	$12.09
Woodward & Lothrop*	10.82
Class H:	
Rowland A. Robbins	5.08
Woodward & Lothrop*	3.40
Class I:	
Rowland A. Robbins*	5.00
Woodward & Lothrop	5.49
Class K:	
Rowland A. Robbins	26.23
Woodward & Lothrop*	20.53
Class L:	
Rowland A. Robbins	33.53
Woodward & Lothrop*	28.62
Class M:	
Rowland A. Robbins	64.25
Woodward & Lothrop*	44.87

Proposals for stationery for the navy-yard, Mare Island, California, under Bureau advertisement dated May 10, 1890, opened June 10, 1890.

Class A:	
Cunningham, Curtis & Welch	$82.50
Rowland A. Robbins*	62.25
H. S. Crocker & Co	68.75
Class B:	
Cunningham, Curtis & Welch	69.06
Rowland A. Robbins*	65 15
H. S. Crocker & Co	76.45
Class C:	
Cunningham, Curtis & Welch	32.45
Rowland A. Robbins*	30.50
H. S. Crocker & Co	33.00
Class D:	
Cunningham, Curtis & Welch	24.65
Rowland A. Robbins*	20.20
H. S. Crocker & Co	24.08
Class E:	
Cunningham, Curtis & Welch	$23.85
Rowland A. Robbins	31.70
H. S. Croker & Co.*	22.40
Class F:	
Cunningham, Curtis & Welch*	6.27
Rowland A. Robbins	9.60
H. S. Crocker & Co	8.00
Class G:	
Cunningham, Curtis & Welch	35.90
Rowland A. Robbins*	25.60
H. S. Crocker & Co	28.00
Class H:	
Cunningham, Curtis & Welch	65.10
Rowland A. Robbins*	61.75
H. S. Crocker & Co	73.80

* Accepted. † Informal.

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Proposals for supplies for the Naval Home, Philadelphia, Pa., under Bureau advertisement dated May 27, 1890, opened June 24, 1890.

Class 9:	
Murta, Appleton & Co	$9.89
Charles J. Field*	8.97
Class 10:	
Edward A. Hollis	.67
Paul J. Field	.90
Murta, Appleton & Co	.54
Charles J. Field*	.50
Class 11:	
Henry L. Nelms*	63.96
J. Jacob Shannon & Co	73.75
Class 12:	
J. B. Shannon & Sons	9.87
Edward A. Hollis	10.01
Paul J. Field	12.95
Murta, Appleton & Co	13.11
J. Jacob Shannon & Co	10.37
Chas. J. Field*	8.20
Class 13:	
Paul J. Field*	652.60
Class 16 A:	
Jacob Reed's Sons*	4,294.00
Wanamaker & Brown	4,465.00
Class 16 B:	
Jacob Reed's Sons	2,824.00
Wanamaker & Brown*	2,769.00
Class 16 C:	
William Kennedy	1,405.00
H. D. Conner*	1,275.00
Robt. Holland	1,293.00
Class 18:	
J. B. Shannon & Sons	241.10
Edward A. Hollis	111.28
Paul J. Field	183.90
Murta, Appleton & Co.†	
Chas. J. Field*	98.53
Class 19:	
Wm. F. Bernstein*	1,257.26
Class 20 A:	
D. L. Hutchinson, jr	3,164.00
David Duncan & Son	3,216.70
George B. Newton & Co	3,453.00
Frank K. Ward	3,345.50
Chas. S. Lowry*	2,996.00
M. Jennings & Son	3,119.25
Tierney & McMamus	3,463.75
Samuel G. French	3,199.75
Thos. McConnell	3,275.00
Fox & Chapman	3,317.50
Class 20 B:	
Frank K. Ward	187.50
Chas. S. Lowry*	174.50
J. Jacob Shannon & Co	225.00
Fox & Chapman	250.00
Class 21:	
Paul J. Field	1,007.15
J. Jacob Shannon & Co	753.93
Chas. J. Field*	669.60
Class 22:	
J. Jacob Shannon & Co.*	64.86
Roller & Shoemaker	71.30
Class 25:	
J. B. Shannon & Sons	282.42
Edward A. Hollis	296.12
Paul J. Field	340.96
Murta, Appleton & Co	230.19
J. Jacob Shannon & Co	301.28
Chas. J. Field*	228.53
Class 26:	
J. B. Shannon & Sons*	35.60
Class 28:	
Chas. T. Adams*	288.42
Class 30:	
J. B. Shannon & Sons*	2.38
Edward A. Hollis	7.50
Paul J. Field	15.00
Murta, Appleton & Co	7.10
J. Jacob Shannon & Co	3.50
Chas. J. Field	6.60
Class 31:	
J. B. Shannon & Sons	11.00
Edward A. Hollis	11.25
Paul J. Field	20.00
Chas. J. Field*	9.40
Class 32:	
Chas. H. Pleasants	$3.70
J. B. Shannon & Sons*	1.70
Paul J. Field	7.50
J. Jacob Shannon & Co	3.00
Chas. J. Field	2.25
Roller & Shoemaker	3.00
Class 33:	
Chas. Maule*	17.50
Elias Pohl	21.50
Class 35:	
Chas. Maule	684.00
J. W. Gaskill & Sons*	653.10
Elias Pohl	691.50
Class 36:	
Chas. Maule	45.00
J. W. Gaskill & Sons	55.00
Elias Pohl*	40.50
Class 37:	
Chas. Maule*	272.00
Elias Pohl	294.50
Class 38:	
Edward A. Hollis*	43.75
Paul J. Field	47.10
Murta, Appleton & Co	57.30
Chas. J. Field	63.29
Class 39:	
Paul J. Field	20.10
Chas. J. Field*	25.70
Class 47:	
J. B. Shannon & Sons	48.33
Edward A. Hollis	47.79
Paul J. Field	55.58
J. Jacob Shannon & Co	51.85
Chas. J. Field*	46.21
Class 48:	
Chas. H. Pleasants	49.00
Paul J. Field	74.50
J. Jacob Shannon & Co	45.30
Roller & Shoemaker*	42.00
Class 50:	
Chas. H. Pleasants	32.50
Paul J. Field	44.60
J. Jacob Shannon & Co.*	24.10
Roller & Shoemaker	29.43
Class 51:	
J. B. Shannon & Sons	7.90
Chas. J. Field	6.25
Class 52 A:	
Chas H. Pleasants	11.70
J. B. Shannon & Sons	12.00
Paul J. Field	15.00
J. Jacob Shannon & Co	11.65
Roller & Shoemaker*	11.20
Class 52 B:	
Chas. H. Pleasants	396.98
J. B. Shannon & Sons*	394.34
Henry L. Nelms & Co	422.50
J. Jacob Shannon & Co	416.54
Roller & Shoemaker	397.30
Class 52 C:	
Chas. H. Pleasants	79.20
J. B. Shannon & Sons	75.60
Edward A. Hollis	78.00
J. Jacob Shannon & Co	79.80
Roller & Shoemaker*	74.40
Class 53:	
J. Jacob Shannon & Co.*	10.20
Class 54 A:	
Daniel Snyder*	9,377.00
Thomas Bradley	9,624.50
Class 54 B:	
Robert McKeone*	9,617.55
Sam'l Sproule	12,258.35
John Scott & Son	10,286.10
Class 54 C:	
Geo. W. Wanklin	2,640.00
Sam'l Sproule*	2,015.00
John Levins	2,580.00
George Bauman	2,170.00
Class 56:	
J. B. Shannon & Sons	3.77
Paul J. Field	4.80
Chas. J. Field*	3.35

* Accepted.

† Informal.

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Proposals for supplies for the Naval Home, Philadelphia, Pa., under Bureau advertisement dated May 27, 1890, opened June 24, 1890—Continued.

Class 58:	
J. B. Shannon & Sons	$10.95
Edward A. Hollis	22.50
Paul J. Field	14.50
Murta Appleton & Co.	12.92
J. Jacob Shannon & Co.	12.50
Chas. J. Field *	8.25
Class 59:	
J. B. Shannon & Sons	.30
Edward A. Hollis *†	.25
Paul J. Field	.35
Murta Appleton & Co.	.45
J. Jacob Shannon & Co.	1.90
Chas. J. Field	.25
Class 60 A:	
Henry L. Nelms & Co.*	71.54
Robert McKeone	78.76
J. Jacob Shannon & Co.	75.76
Samuel Sproule	77.05
Roller & Shoemaker	93.05
Class 60 B:	
F. H. Leggett & Co.*	1,208.55
J. B. Morrell & Co	1,225.00
Joseph Pollard	1,400.00
Class 61:	
Paul J. Field	35.00
J. Jacob Shannon & Co.*	13.37
Roller & Shoemaker	15.00
Class 63:	
J. B. Shannon & Sons	28.80
Paul J. Field	20.00
J. Jacob Shannon & Co.*	5.00
Chas. J. Field	29.30
Class 64:	
J. B. Shannon & Sons	16.53
Paul J. Field	36.10
Murta Appleton & Co.	21.56
J. Jacob Shannon & Co.*	12.59
Chas. J. Field	16.25
Class 65:	
J. B. Shannon & Sons	18.24
Paul J. Field	15.80
Murta Appleton & Co.	20.88
Class 65—Continued.	
J. Jacob Shannon & Co.	$14.77
Chas. J. Field*	10.10
Class 66:	
J. B. Shannon & Sons	6.43
Edward A. Hollis	3.34
Paul J. Field	4.70
Murta Appleton & Co.	3.80
J. Jacob Shannon & Co.	4.39
Chas. J. Field*	3.32
Class 67:	
Edward A. Hollis	62.00
Paul J. Field	122.70
Murta Appleton & Co.*	56.57
J. Jacob Shannon & Co.	67.20
S. C. Forsaith Machine Company	62.17
Chas. J. Field	56.71
Class 68:	
Paul J. Field	78.34
Murta Appleton & Co.	79.02
J. Jacob Shannon & Co.	118.33
Chas. J. Field *	67.98
Class 69:	
J. B. Shannon & Sons	22.82
Paul J. Field	23.80
Murta Appleton & Co.	71.60
J. Jacob Shannon & Co. *	20.49
Chas. J. Field	22.40
Class 70:	
J. B. Shannon & Sons	7.34
Paul J. Field *	6.70
J. Jacob Shannon & Co.	7.88
Chas. J. Field	7.17
Class 71 A:	
Paul J. Field	445.65
Robert McKeone *	357.55
J. Jacob Shannon & Co.	487.47
Class 71 B:	
Paul J. Field*	272.00
Class 71 C:	
Chas. B. Rees Son & Co.	600.00
Knickerbocker Ice Co. *†	600.00

Proposals for provisions, etc., for the New York navy-yard under Bureau advertisement dated May 21, 1890, opened June 24, 1890.

19,600 pounds wheat flour:	
Francis H. Leggett & Co	$0.02 44/100
J. B. Morrell & Co. *	.02 4/10
12,000 pounds salt beef in barrels:	
Henry M. Anthony	.04 88/100
Francis H. Leggett & Co	.04 4/10
Chas. T. Mattlage	.04 33/100
J. B. Morrell & Co. *	.04½
10,000 pounds rice:	
Francis H. Leggett & Co. *	.07 1/10
12,000 pounds butter:	
Simpson, McIntyre & Co. *	.22½
12,000 pounds tomatoes:	
Kemp, Day & Co.	.03 23/100
Francis H. Leggett & Co. *	.03 24/100
1,000 agate bowls:	
Rowland A. Robbins	303.70
J. B. Morrell & Co. *	295.00
1,600 agate bowls—Continued.	
Joseph Wechsler	$301.25
Tissot & Schults	299.00
1,000 agate cups:	
Rowland A. Robbins	421.30
J. B. Morrell & Co*	412.50
Joseph Wechsler	421.25
Tissot & Schults	415.00
2 iron chests, first size:	
Marc M. Michael *	91.48
5 iron chests, second size:	
Marc M. Michael *	188.70
5 iron chests, third size:	
Marc M. Michael *	163.70
10,000 pounds candles:	
R. G. Mitchell	.12
Gustave De Reisthal *	.09 8/10
Manhattan Oil Co.	.09 44/100

Proposals for coal for the naval hospitals under Bureau advertisement dated May 20, 1890, opened June 24, 1890.

Class 20 A:	
David Duncan & Son	$2,220.10
Charles A. Campbell *	1,916.60
Samuel G. French	2,027.60
Class 20 B:	
Saml. G. French *	1,498.00
Class 20 C:	
M. Jennings & Sons	1,541.70
Daniel L. Hutchinson, jr	1,582.75
David Duncan & Son *	1,516.25
Tierney & McManus	1,597.50
Thomas McConnell	1,650.75
Samuel G. French	1,599.40
Class 20 D:	
M. Jennings & Sons *	$36.75
David Duncan & Son	41.30
Samuel G. French	52.50
Class 20 E:	
George L. Sheriff *	407.20
Johnson Bros	452.00
William G. Wheatley	423.20
Stephenson & Bro.	436.00
Samuel G. French	560.00

* Accepted.

† Decided by lot.

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Proposals for coal for the naval hospitals under Bureau advertisement dated May 20, 1890, opened June 24, 1890—Continued.

Class 20 F:	
George L. Sheriff*	$31.74
Johnson Bros	36.00
William G. Wheatly	32.58
Stephenson & Bro	34.20
Samuel G. French	42.00
Class 20 G:	
George L. Sheriff*	199.60
Johnson Bros	220.00
William G. Wheatly	211.60
Stephenson & Bro	218.00
Samuel G. French	280.00
Class 20 H:	
John W. Oast & Bro	$1,372.50
David Duncan & Son*	1,262.00
Samuel G. French	1,296.00
Class 20 I:	
Cary & Co	150.00
Samuel G. French*	120.00
Class 20 K:	
James McCudden†	3,492.00
William Walker	3,753.00
Samuel G. French	6,364.00

Proposals for furniture for the U. S. S. San Francisco, at the Mare Island navy-yard, under Bureau advertisement dated May 26, 1890, opened July 1, 1890.

Class 21:	
Joseph Wechsler	$3,016.50
Class 21—Continued.	
F. W. Kreling & Sons*	$1,742.50

Proposals for copper pipe and sheet copper for the Mare Island navy-yard, under Bureau advertisement dated June 10, 1890, opened July 15, 1890.

Class 53:	
Dunham, Carrigan & Hayden Co.*	$344.24
Austin & Phelps	449.68
Rowland A. Robbins	435.92
S. C. Forsaith Mch. Co	366.06
J. Friedenstein	363.28
Class 39:	
Dunham, Carrigan & Hayden Co.*	1,274.43
Class 39—Continued.	
Austin & Phelps	$1,773.12
Park Bro. & Co	1,281.35
Rowland A. Robbins	1,828.33
S. C. Forsaith Mch. Co	1,475.92
Detroit Copper and Brass Rolling Mills‡	1,274.43
J. Friedenstein	1,274.17

Proposals for granite for the Mare Island navy-yard, under Bureau advertisement dated June 19, 1890, opened July 22, 1890.

Class 13:	
M. W. Blanchard	$5,500.00
J. P. M. Phillips	3,278.00
Robert L. Fox	3,190.00
Class 13—Continued.	
John N. Taylor	$3,234.00
John G. Day*	3,750.00
Western Granite and Marble Co	4,409.00

Proposals for furniture and stores for the Concord and Bennington and fan blowers for the Galena at the New York navy-yard, under Bureau advertisement dated July 10, 1890, opened July 29, 1890.

Class 21 A:	
Rowland A. Robbins	$1,189.00
Joseph Wechsler*	1,131.75
Class 21 B:	
Rowland A. Robbins	1,189.00
Joseph Wechsler*	1,131.75
Class A:	
J. B. Morrell & Co	1,464.81
Rowland A. Robbins	1,433.34
James W. Soper	1,625.73
A. Schrader*	1,390.14
Class B:	
J. B. Morrell & Co.*	254.00
Rowland A. Robbins	303.10
Class C:	
J. B. Morrell & Co.*	688.24
Gould & Cutler Corporation	843.80
Charles M. Childs & Co	765.62
Rowland A. Robbins	832.70
Charles H. Pleasants	851.17
Wm. McDonagh & Co	787.20
Class D:	
Charles H. Pleasants*	129.60
Class E:	
J. B. Morrell & Co	1,490.01
Class E—Continued.	
Rowland A. Robbins	$1,449.64
James W. Soper	1,633.97
A. Schrader*	1,396.02
Class F:	
J. B. Morrell & Co	254.00
Rowland A. Robbins	303.10
Class G:	
J. B. Morrell & Co.*	688.24
Gould & Cutler Corporation	843.80
Charles M. Childs & Co	765.62
Rowland A. Robbins	832.70
Charles H. Pleasants	851.17
William McDonagh & Co	787.20
Class H:	
Charles H. Pleasants*	129.60
Class 38:	
Donegan & Swift*	1,015.00
B. F. Sturtevant	1,600.00
Class 59:	
Joseph W. Duryee*	295.00
Watson & Pittinger	300.00
Enoch L. Richardson	337.50
John McClave	322.50

*Accepted. † Contract canceled. ‡ Informal.

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Proposals for copper conductors and slate for the Boston navy-yard, under Bureau advertisement dated July 11, 1890, opened July 29, 1890.

Class 13:	
Edward Marley & Bros.*	$667.80
Class 13—Continued.	
Burditt & Williams	$807.00

Proposals for provender for navy-yards, under Bureau advertisement dated July 15, 1890, opened August 5, 1890.

Class 71 A, Portsmouth navy-yard:	
Joseph Hitt	$1,852.25
Geo. A. Hammond	1,588.50
James E. Chase*	1,465.95
Jefferson T. Lewis	1,713.85
Class 71 B, Boston navy-yard:	
John Mullett*	1,957.05
Class 71 C, New York navy-yard:	
W. H. Belford	2,589.10
John Moonan*	2,422.80
Class 71 D, League Island navy-yard:	
Robert McKnight & Sons*	630 75
Paul J. Field	640.75
W. W. Jones & Co	681.00
Class 71 E, Naval Academy:	
John Kealy	870.72
Class 71 E, Naval Academy—Continued.	
Joseph S. M. Basil	$858.60
Henry E. Myers*	857.60
Class 71 F, Washington navy-yard:	
Myers & Loving*	1,375.42
Class 71 G, Norfolk navy-yard:	
O. L. Williams	1,652.30
J. T. Parker	1,745.00
Evans & Grandy*	1,632.50
A. H. Lindsay	1,766.75
Class 71 H, Pensacola navy-yard:	
Jeremiah O'Neal	896.55
E. A. Philibert	789.34
Fred. Bauer*	781.78
T. J. McKenzie Oerting	795.20

Proposals for fuel, provender, and equipment stores for Mare Island navy-yard, and coal for Honolulu, Hawaiian Islands, under Bureau advertisement dated July 14, 1890, opened August 5, 1890.

Class 20 A:	
Sam'l G. French	$27,468.00
A. Powell	24,570.00
David Duncan & Son	28,980.00
Wm. Walker	24,412.50
Wilson & O'Brien	23,782.50
Henry Rosenfeld*	22,518.75
John L. Howard	23,609.25
Class 20 B:	
Samuel G. French	52,034.40
A. Powell	25,586.85
David Duncan & Son	43,330.00
Wm. Walker	29,448.50
Wilson & O'Brien	25,339.25
Henry Rosenfeld*	23,540.50
John L. Howard	24,945.50
Class 20 C:	
A. Powell	1,410.00
William Walker	1,488.30
Wilson & O'Brien*	1,237.50
Class 20 D:	
A. Powell	300.00
William Walker*	181.25
Aden Brothers	250.00
Class 71:	
Louis E. Lake	$3,337.50
Aden Brothers	3,500.00
Class 14:	
Marc M. Michael	1,449.00
Louis E. Lake*	1,258.50
Neville & Co	1,355.25
J. H. Lane & Co.†	
Class 19:	
Marc M. Michael	106.70
Louis E. Lake	174.00
Chas. H. Pleasants*	90.45
Class 32:	
Louis E. Lake*	112.50
Class 52:	
Chas. H. Pleasants*	198.25
Wm. P. Fuller	243.25
Class 59:	
Louis E. Lake	950.00
Chas. H. Pleasants*	550.00
Class 20 A, coal for Honolulu:	
Samuel G. French	16,440.00
David Duncan & Son	18,400.00
Henry Rosenfeld*	15,870.00

Proposals for coal for the Portsmouth, N. H., navy-yard, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
Samuel G. French	$5,268.00
David Duncan & Son	5,301.00
J. Albert Walker	5,400.00
Philadelphia and Reading Coal and Iron Co.*	4,537.50
Class 20 B:	
Samuel G. French	771.00
Class 20 B—Continued.	
David Duncan & Son*	$696.00
J. Albert Walker	750.00
Class 20 C:	
William G. Brown*	123.75
Joseph Langton	145.00
Geo. A. Hammond	175.00

Proposals for fuel for the Boston navy-yard, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
C. A. Campbell*	$7,621.40
S. G. French	7,950.00
David Duncan & Son	8,656.34
J. Albert Walker	8,398.50
E. D. Townsend	8,149.60
The Philadelphia and Reading Coal and Iron Co	7,749.50
Class 20 B:	
C. A. Campbell	536.80
S. G. French	605.00
Class 20 B—Continued.	
David Duncan & Son	$537.90
E. D. Townsend*	495.00
Class 20 C:	
S. G. French	25.00
John Mullett*	20.00
Class 20 D:	
C. A. Campbell*	56.00
S. G. French	77.00
E. D. Townsend	63.00
John Mullett	69.50

*Accepted.

†Informal.

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Proposals for fuel for the naval station, New London, Conn., under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
Samuel G. French	$500.00
David Duncan & Son	431.20
The Philadelphia and Reading Coal and Iron Co.*	376.00
Class 20 D:	
Samuel G. French*	$25.00

Proposals for fuel for naval torpedo station, Newport, R. I., under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
S. G. French	$5,650.40
David Duncan & Son	6,240.80
Gardner B. Reynolds	5,916.00
Philadelphia and Reading Coal and Iron Co.*	5,517.00
Class 20 B:	
S. G. French	$96.00
David Duncan & Son	60.00
Gardner B. Reynolds & Co.*	60.00

Proposals for fuel for the Naval Training Station, Newport, R. I., under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
Samuel G. French*	$3,929.00
David Duncan & Son	4,573.00
Gardner B. Reynolds & Co	4,395.00
The Philadelphia and Reading Coal and Iron Co	4,165.00
Class 20 B:	
Samuel G. French	35.00
Class 20 B—Continued.	
David Duncan & Son	$23.75
Gardner B. Reynolds & Co.*	25.00
Class 20 D:	
Samuel G. French	54.00
Gardner B. Reynolds & Co.*	42.00

Proposals for fuel for the navy-yard, New York, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
Samuel G. French	$64,792.90
David Duncan & Son	63,920.75
Barber & Ziegler*	63,471.65
Edward R. Dunham	64,546.60
David S. Wells	64,356.30
The Philadelphia and Reading Coal and Iron Co	67,728.75
Class 20 B:	
David Duncan & Son*	$4,915.75
Barber & Ziegler	5,253.45
Class 20 C:	
Samuel G. French*	963.00
Daniel Bertolet†	
Rowland A. Robbins	1,348.80

Proposals for fuel for the League Island Navy-yard, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
Samuel G. French	$2,120.08
David Duncan & Son	2,308.78
Thomas McConnell	2,279.86
George W. Bush & Sons	2,892.00
The Philadelphia and Reading Coal and Iron Co.*	2,110.80
Daniel L. Hutchison, jr	2,149.00
Class 20 B:	
Samuel G. French	$189.00
David Duncan & Son	139.05
Thomas McConnell*	106.65
George W. Bush & Sons	135.00
Daniel L. Hutchinson, jr	128.25

Proposals for fuel for the Naval Academy, Annapolis, Md., under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
John Kealy	$4,337.05
David Duncan & Son	4,622.10
William E. Hodge	4,340.00
Joseph S. M. Basil*	3,871.90
Class 20 B:	
David Duncan & Son*	14,153.75
William E. Hodge	14,905.00
Class 20 B—Continued	
Johnson Brothers	$14,216.50
Meredith Winship & Co	14,218.25
Class 20 D:	
John Kealy	$16.90
Henry B. Myers	$18.20
Joseph S. M. Basil*	295.80

*Accepted.

†Informal.

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Proposals for fuel for the Washington Navy-yard, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
David Duncan & Son	$3,589.40
Wm. E. Hodge*	3,180.50
Stephenson & Bro	4,580.00
Geo. L. Sheriff	3,364.95
Johnson Brothers	3,255.25
Class 20 B:	
Stephenson & Bro	25,515.00
Geo. L. Sheriff	26,649.00
S. M. Hamilton	26,244.00
Class 20 B—Continued.	
Johnson Brothers*	$26,168.00
Wm. L. Read*	24,138.00
Class 20 C:	
Johnson Brothers*	475.00
Class 20 D:	
Sam'l T. Oast	1,250.00
Stephenson & Bro.*†	626.00
Geo. L. Sheriff	786.00
Johnson Brothers	626.00

Proposals for fuel for the Norfolk Navy-yard, under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 A:	
David Duncan & Son	$2,146.90
Geo. L. Neville	2,235.00
Nottingham & Wrenn*	1,912.75
Class 20 B:	
Wm. Lamb & Co.*	5,269.95
David Duncan & Son	5 336.87
Class 20 C:	
Geo. L. Neville*	$920.00
Nottingham & Wrenn	977.00
Class 20 D:	
Sam'l T. Oast	93.75
Geo. L. Neville*	87.00

Proposals for fuel for the Navy-yard, Pensacola, Fla., under Bureau advertisement dated July 12, 1890, opened August 5, 1890.

Class 20 D:	
Frank Edwards	$100.10
Fred. Bauer	106.60
Class 20 D—Continued.	
E. J. McKenzie Oerting	$104.00
Jeremiah O'Neal*	84.00

Proposals for machinery, lumber, constructor's stores, etc., for the New York Navy-yard, under Bureau advertisement dated July 17, 1890, opened August 12, 1890.

Class 38:	
Rowland A. Robbins	$1,309.20
George V. Cresson*	1,294.34
Class 37:	
Lewis H. Ross	821.50
James H. Pittinger	727.25
Joseph W. Duryee*	697.50
Class 35:	
Lewis H. Ross	1,450.00
James H. Pittinger	1,350.00
Joseph W. Duryee*	1,228.50
James McIntosh	1,417.50
John McClane	1,900.00
Class 52:	
Charles M. Childs & Co	139.88
J. B. Morrell & Co	139.88
Tissot & Schultz	155.35
Burditt & Williams	167.00
Gould & Cutler Corporation	135.75
John E. Summers Paint Co	139.25
Charles H. Pleasants	138.43
Rowland A. Robbins	142.50
Wm. McDonagh & Co.*	135.64
Class 47:	
J. B. Morrell & Co	52.34
Burditt & Williams	55.00
Charles H. Pleasants*	47.58
Eugene L. Maxwell	47.80
Rowland A. Robbins	50.00
Class 58:	
J. B. Morrell & Co.*	2.75
Tissot & Schultz	11.20
Burditt & Williams	13.40
Charles H. Pleasants	13.62
Eugene L. Maxwell	11.00
Rowland A. Robbins	11.90
Class 39:	
Charles H. Pleasants	858.71
R. A. Robbins*	657.00
Class 40:	
J. B. Morrell & Co	42.50
Charles H. Pleasants	25.27
Eugene L. Maxwell	31.50
Rowland A. Robbins	32.50
Class 68:	
Burditt & Williams	64.80
Charles H. Pleasants*	19.80
Rowland A. Robbins	37.80
Class 68—Continued.	
William McDonagh & Co	$48.60
Class A:	
Tissot & Schultz	126.07
Burditt & Williams*	79.15
Rowland A. Robbins	93.70
Class 11:	
Burditt & Williams	20.50
Gould & Cutler Corporation*	6.37
Charles H. Pleasants	6.86
Rowland A. Robbins	18.53
Class 47:	
J. B. Morrell & Co	45.50
Burditt & Williams	50.00
Charles H. Pleasants*	42.84
Eugene L. Maxwell	43.00
Rowland A. Robbins	44.00
Class 52:	
Charles M. Childs & Co	129.55
J. B. Morrell & Co	129.55
Tissot & Schultz	142.92
Burditt & Williams	154.70
Gould & Cutler Corporation	125.70
John E. Summers	132.60
Charles H. Pleasants	130.97
Rowland A. Robbins	133.95
William McDonagh & Co.*	125.55
Class 52 A:	
Charles H. Pleasants*	44.40
Class 52 B:	
Charles M. Childs & Co	249.13
J. B. Morrell & Co.*	224.85
Tissot & Schultz	271.44
Burditt & Williams	297.46
Gould & Cutler Corporation	252.80
John E. Summers	275.15
Charles H. Pleasants	260.42
Rowland A. Robbins	270.68
William McDonagh & Co	227.22
Class 36:	
Lewis H. Ross	3,200.00
James H. Pittinger	2,210.50
Tissot & Schultz	2,401.40
Eppinger & Russell*	2,138.50
Rowland A. Robbins	3,494.40
Joseph W. Duryee	2,172.17
James McIntosh	2,237.80
John McClave	2,457.00

* Accepted.

† Decided by lot.

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Proposals for machines, belting, etc., for the Norfolk Navy-yard, under Bureau advertisement dated July 18, 1890, opened August 12, 1890.

Class 38 A:	
Richle Bros*	$450.00
Class 38 B:	
Mayer & Co	864.00
S. C. Forsaith Machine Co	877.76
Thomas H. Dallet & Co.*	836.78
Eugene L. Maxwell	872.00
Norfolk Supply Co	864.00
Geo. L. Neville	1,200.00
Class 61:	
Rowland A. Robbins	132.46
Geo. L. Neville	179.20
Hume & Billsoly*	97.70
Class 32:	
Mayer & Co	975.50
S. C. Forsaith Machine Co	902.45
Eugene L. Maxwell	874.75
R. A. Robbins	959.65
Melville Lindsay	814.48
Page Belting Co	786.25
E. B. Preston	843.50
Wm. B. Brooke	922.40
The Graton & Knight Manufacturing Co.*	739.25
Tissot & Schultz	1,252.80
Burditt & Williams	1,045.05
Geo. L. Neville	970.00
Class 17:	
Mayer & Co.*	635.00
S. C. Forsaith Machine Co	1,079.69
Eugene L. Maxwell	736.80
Geo. L. Neville	962.95
Class 38 C:	
Mayer & Co	$385.00
S. C. Forsaith Machine Co.*	378.00
Eugene L. Maxwell	385.00
Norfolk Supply Co	379.00
Geo. L. Neville	416.00
Class 41:	
Mayer & Co	275.20
S. C. Forsaith Machine Co	353.92
Rowland A. Robbins	345.60
Geo. L. Neville*	261.12
Class 42:	
Mayer & Co	34.16
R. A. Robbins	22.90
Norfolk Supply Co	15.86
Geo. L. Neville*	13.42
Class 53:	
Mayer & Co	317.59
S. C. Forsaith Machine Co	357.94
Chas. H. Pleasants	375.65
Norfolk Supply Co.*	307.26
Geo. L. Neville	330.69
Class 62:	
S. C. Forsaith Machine Co	680.00
Rowland A. Robbins*	582.00
Geo. L. Neville	750.00
Class 71:	
Mayer & Co	516.83
Wm. C. Lewis	516.56
Chas. H. Pleasants*	435.22
Rowland A. Robbins	558.51
Geo. L. Neville	449.41

Proposals for lumber, etc., for the League Island Navy-yard, under Bureau advertisement dated July 19, 1890, opened August 12, 1890.

Class 10:	
Billany & Cochrane*..per pound..	$0.03
Chas. H. Pleasants.....do....	.0398
Rowland A. Robbins.....do....	.04¼
S. C. Forsaith Machine Co ..do....	.03 7/16
Burditt & Williams .....do....	.03⅜
Class 36:	
Eppenger & Russell	3,126.30
Elias Pohl	3,244.48
Wm. A. Levering	4,433.00
Class 36—Continued.	
J. W. Gaskell & Sons *	$2,947.20
Class 37:	
Elias Pohl	840.00
J. W. Gaskill & Sons*	720.00
Class 47:	
Elias Pohl	45.00
Chas. H. Pleasants*	24.20
Burditt & Williams.	30.00

Proposals for constructors' stores for the Portsmouth navy-yard under Bureau advertisement dated July 21, 1890; opened August 12, 1890.

Class A:	
Rider & Cotton*	$150.60
Patrick Cavanaugh	182.30
J. B. Morrell & Co	187.31
Burditt & Williams	190.90
Class B:	
Burditt & Williams*	36.55
Class C:	
S. C. Forsaith Machine Co	226.50
Rider & Cotton*	175.00
Burditt & Williams	197.00
Class D:	
S. C. Forsaith Machine Co.*	79.20
Class D—Continued.	
Rowland A. Robbins	$84.00
Burditt & Williams	96.00
Class F:	
Rider & Cotton	30.75
Rowland A. Robbins	29.70
Chas. H. Pleasants*	26.50
J. B. Morrell & Co	30.00
Burditt & Williams	30.50
Class 50:	
Rider & Cotton*	194.25

Proposals for steel material for the U. S. S. Amphitrite, at the Norfolk navy-yard, under Bureau advertisement dated July 16, 1890; opened August 12, 1890.

Class A:	
Carnegie, Phipps & Co., * per pound.	0.04¾
Class A:	
Carnegie Phipps & Co., * per pound.	0.04¾
Class D:	
Carnegie Phipps & Co., * per pound.	0.04¾
Class E:	
R. A. Robbins	$3,711.46
J. H. Sternbergh & Son*	2,587.20

* Accepted.

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Proposals for provisions and clothing for the New York navy-yard under Bureau advertisement dated August 1, 1890; opened August 26, 1890.

33,000 pounds wheat flour (per pound):
- J. B. Morrell & Co. — $0.03
- Thurber, Whyland & Co — .03 3/4
- Francis H. Leggett & Co.* — .02 97/100

25,000 barrels salt pork (per pound):
- J. B. Morrell & Co. — .07 1/4
- Chas. F. Mattlage.* — .06 98/100

36,000 pounds tomatoes (per pound):
- Kemp, Day & Co. — .03 99/100
- Thurber, Whyland & Co — .04
- Francis H. Leggett & Co.* — .03 97/100

12,000 pounds corned beef (per pound):
- Tissot & Shultz — .09
- Henry M. Anthony — .08 1/2
- Kemp, Day & Co. — .07 7/8
- Thurber, Whyland & Co.* — .07 98/100
- Armour & Co — .09 96/100
- Chas. F. Mattlage — .08 99/100
- Francis H. Leggett & Co. — .08 1/2

6,000 pounds ham (per pound):
- Henry M. Anthony* — .10 1/2
- Kemp, Day & Co. — .15 1/2
- Thurber, Whyland & Co — .14 98/100
- Armour & Co — .14
- Francis H. Leggett & Co. — .14 97/100

2,000 pounds bacon (per pound):
- Tissot & Schultz — .12
- Kemp, Day & Co. — .10 1/2
- Chas. F. Mattlage* — .09 97/100

3,000 pounds sausage (per pound):
- Henry M. Anthony — .09 1/2
- Kemp, Day & Co. — .11 7/8
- Armour & Co*; — .09 7/8
- Francis H. Leggett — .11 1/2

1,000 pounds tea (per pound):
- M. F. Powers — .27
- Robt. G. Thomas — .24
- J. B. Morrell & Co.* — .21 94/100
- Thurber, Whyland & Co — .26 96/100
- Francis H. Leggett & Co. — .21 97/100

12,000 pounds canned vegetables (per pound):
- Kemp, Day & Co. — $0.06 48/100
- Thurber, Whyland & Co. — .06 94/100
- Francis H. Leggett & Co.* — .05 97/100

7,000 yards blue cloth for trousers (per yard):
- Wendell, Fay & Co. — 2.37 45/100
- Francis H. Smith — 2.39 1/2
- Sullivan, Vail & Co. — 2.37
- Frank A. Carnes — 2.42
- B. Y. Pippey & Co.* — 2.29

5,000 pairs calfskin shoes (per pair):
- Geo. F. Roedel — 1.84 1/2
- J. Freeman Shoe Manufacturing Company* — 1.74 99/100
- Joseph Wechsler — 2.29

10,000 pairs woolen socks (per pair):
- B. Y. Pippey & Co.* — .84

1,000 mattresses (each):
- Wm. F. Bernstein* — 2.95 98/100
- Joseph Wechsler — 2.99 94/100
- J. W. Moyer — 3.00

2,000 mattress covers (each):
- Wm. F. Bernstein — .56
- Joseph Wechsler* — .55

15,000 silk neckerchiefs (each):
- Bridgeport Silk Company — .97 1/2
- Marc M. Michael* — .96 97/100
- Joseph Wechsler — .98 99/100
- Grimshaw Brothers — 1.05

5,000 yards blue cloth for caps (per yard):
- Wendell, Fay & Co.* — 1.82 45/100
- Francis H. Smith — 2.07
- Sullivan, Vail & Co — 1.98 1/2
- Frank A. Carnes — (†)
- B. Y. Pippey & Co. — 1.98

3,000 yards thin blue flannel (per yard):
- Henry T. Kent* — .86
- B. Y. Pippey & Co. — .86 1/2

Proposals for material for repairs to oob dock at the New York navy-yard under Bureau advertisement dated August 4, 1890; opened August 26, 1890.

Class 53 A:
- S. C. Forsaith Machine Co. — $340.74
- McNeal Pipe and Foundry Co.* — 299.95
- Thos. G. Knight — 344.94
- John Fox — 314.95
- J. B. Morrell & Co. — 347.94
- R. A. Robbins — 316.48

Class 20:
- Thos. G. Knight — 34.00
- J. B. Morrell & Co.* — 31.00
- R. A. Robbins — 31.80

Class 50:
- R. A. Robbins* — 42.00

Class 63:
- R. A. Robbins* — 112.00

Class 17:
- S. C. Forsaith Machine Co. — 372.27
- Thos. G. Knight — 332.31
- Eugene L. Maxwell* — 290.00
- R. A. Robbins — 294.30

Class 36 A:
- John McClave — 321.10
- Eppinger & Russell — 308.75
- Joseph W. Duryee — 333.45
- Chas. R. Hewitt* — 272.94
- James Bigler — 370.50
- Geo. L. Neville — 333.45
- L. R. Millen & Co. — 330.36
- Jas. H. Pittinger — 338.39

Class 37 A:
- John McClave — 350.00
- Joseph W. Duryee* — 322.00
- Geo. L. Neville — 455.00
- R. A. Robbins — 336.00
- Jas. H. Pittinger — 518.00

Class 53 B:
- S. C. Forsaith Machine Co. — $4,175.87
- McNeal Pipe and Foundry Co. — 3,889.53
- Thos. G. Knight* — 3,716.28
- John Fox — 3,967.50
- R. A. Robbins — 3,996.12
- R. A. Robbins — 3,996.12

Class 42:
- S. C. Forsaith Machine Co — 1,826.13
- R. A. Robbins* — 1,598.40

Class 36 B:
- S. C. Forsaith Machine Co — 28,471.30
- John McClave — 21,532.50
- Eppinger & Russell — 22,728.75
- Francis H. Smith — 25,839.00
- Joseph W. Duryee — 22,393.80
- Chas. R. Hewitt — 22,594.70
- James Bigler — 22,202.00
- Geo. L. Neville* — 19,348.00
- Theodore F. Booth — 23,224.25
- L. R. Millen & Co. — 22,106.70
- James H. Pittinger — 25,264.80

Class 13 A:
- Francis H. Smith — 6,315.00
- John J. Donovan — 4,993.00
- John A. Bonker* — 4,645.00
- Calvin Tomkins — 4,957.00
- R. A. Robbins — 5,456.00
- John S. Howell — 5,586.00

Class 38 A:
- S. C. Forsaith Machine Co. — 3,222.00
- Joseph S. Monday* — 3,150.00
- R. A. Robbins — 3,240.00

Class 36 C:
- John McClave — 182.00

*Accepted. †Informal. ‡Decided by lot.

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Proposals for material for repairs to cob dock at the New York navy-yard, etc.—Continued.

Class 36 C—Continued.	
Eppinger & Russell	$168.00
Joseph W. Duryee	164.50
Charles R. Hewitt	154.70
James Bigler	203.00
George L. Neville*	140.00
L. R. Millen & Co	148.75
James H. Pittinger	174.30
Class 37 B:	
John McClave*	204.00
Joseph W. Duryee	212.40
George Carr & Co	228.00
James Bigler	258.00
James H. Pittinger	208.80
Class 37 C:	
John McClave*	8,702.50
Joseph W. Duryee	12,390.00
George Carr & Co	13,275.00
James Bigler	10,177.50
James H. Pittinger	14,160.00
Class 13 B:	
James Brand	7,395.00
Sinclair & Babson*	7,134.00
R. A. Robbins	7,743.00
Howard Fleming	7,511.00
Class 13 C:	
Francis H. Smith	6,800.00
John Beattie	8,850.00
Brown, McAllister & Co	7,950.00
Booth Brothers.*	6,750.00
Class 38 B:	
S. C. Forsaith Machine Co	1,040.00
Joseph S. Monday*	960.00
R. A. Robbins	1,868.00
Class 10:	
S. C. Forsaith Machine Co	1,944.85
J. H. Sternbergh & Son*	1,696.50
J. B. Morrell & Co	1,858.45
Tissot & Schults	3,086.32
James Bigler	1,934.87
George L. Neville	2,227.50
James W. Soper	2,185.87
Eugene L. Maxwell	1,892.25
R. A. Robbins	2,058.50
Class 40:	
S. C. Forsaith Machine Co	$961.50
Charles H. Pleasants	758.30
J. B. Morrell & Co	764.10
James Bigler	742.50
George L. Neville*	594.00
R. A. Robbins	729.00
Class 47:	
S. C. Forsaith Machine Co	249.50
Charles H. Pleasants	169.80
J. B. Morrell & Co	166.80
James Bigler	206.25
George L. Neville	183.00
James W. Soper	168.30
E. L. Maxwell*	157.00
R. A. Robbins	175.00
Class 9:	
S. C. Forsaith Machine Co.*	81.00
James W. Soper	87.00
Eugene L. Maxwell	93.00
R. A. Robbins	92.82
Class 12:	
J. B. Morrell & Co	121.00
George L. Neville	187.00
James W. Soper*	113.74
R. A. Robbins	153.34
Class 67:	
J. B. Morrell & Co	52.78
George L. Neville	75.00
James W. Soper	45.69
E. L. Maxwell	53.19
R. A. Robbins*	42.66
Class 68:	
J. B. Morrell & Co*	41.54
George L. Neville	56.00
James W. Soper	47.32
R. A. Robbins	44.49
Class 70:	
George L. Neville	200.00
James W. Soper	172.00
E. L. Maxwell*	147.00
R. A. Robbins	194.00

Proposals for stationery, drafting material, etc., for the Mare Island navy-yard, under Bureau advertisement dated August 5, 1890; opened August 26, 1890.

Class 61 A:	
Louis E. Lake	$162.38
Cunningham, Curtis & Welsh*	150.56
Class 30:	
H. S. Crocker & Co.*	155.00
Louis E. Lake	173.51
Class 61 B:	
George G. Wickson*	$41.13
Louis E. Lake	57.85
Class 26:	
S. C. Forsaith Machine Co.*	102.06

Proposals for material for the monitor Puritan, at the New York navy-yard, under Bureau advertisement dated August 20, 1890; opened September 16, 1890.

Class 5:	
Higgins Brothers*	$92.00
Lewis H. Ross	106.00
Joseph W. Duryee	140.00
Class 7:	
Joseph W. Duryee	12,636.65
John McClave*	9,860.22
Class 13:	
Higgins Brothers	3,629.00
Lewis H. Ross*	3,394.25
Joseph W. Duryee	4,017.50
Watson & Pittinger	3,453.00
John McClave	3,646.50
Class 15:	
Higgins Brothers	993.40
Lewis H. Ross	1,036.93
Joseph W. Duryee	1,256.30
Watson & Pittinger	1,107.20
John McClave*	972.00
Class 18:	
Tissot & Schults	$1,075.50
Lewis H. Ross*	715.50
Joseph W. Duryee	800.00
Watson & Pittinger	765.00
John McClave	740.00
Class 22:	
C. F. Hodsdon*	318.50
Lewis H. Ross	332.50
Joseph W. Duryee	357.50
John McClave	363.50
Class 26:	
Chas. H. Pleasants	129.51
J. B. Morrell & Co	129.50
Harry L. Briggs	131.40
R. A. Robbins*	128.40
Class 32:	
J. B. Morrell & Co.*	549.12
R. A. Robbins	562.45

*Accepted.

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Proposals for material for the monitor Puritan, at the New York navy-yard, etc.—Continued.

Class 37:	
J. B. Morrell & Co	$1,228.88
Harry L. Briggs	1,307.08
J. H. Sternbergh & Son*	996.60
R. A. Robbins	1,307.00
Class 39:	
Chas. H. Pleasants	122.01
J. B. Morrell & Co	136.05
Harry L. Briggs	125.70
R. A. Robbins*	119.35
Class 48:	
H. T. Wakeman	260.15
J. B. Morrell & Co.*	76.95
Harry L. Briggs	146.73
R. A. Robbins	187.90
Burditt & Williams	263.94
Class 49:	
Tissot & Schults	361.95
James W. Soper	462.40
Chas. H. Pleasants	370.86
H. T. Wakeman	373.52
Morse Burtis*	358.00
J. B. Morrell & Co	383.96
Harry L. Briggs	357.65
Rowland A. Robbins	367.21
Burditt & Williams	357.70
Class 54:	
H. T. Wakeman	593.72
J. B. Morrell & Co	575.30
Harry L. Briggs*	510.58
R. A. Robbins	538.38
Class 56:	
Chas. M. Childs & Co	387.00
Tissot & Schultz	420.00
Chas. H. Pleasants*	367.50
H. T. Wakeman	405.00
Morse Burtis	420.00
J. B. Morrell & Co	390.00
Harry L. Briggs	397.50
R. A. Robbins	390.00
Class 57:	
Chas. M. Childs & Co	172.20
Tissot & Schultz	210.00
Chas. H. Pleasants*	156.00
H. T. Wakeman	262.50
J. B. Morrell & Co	180.00
Harry L. Briggs	183.75
R. A. Robbins	186.00
Class 58:	
Chas. M. Childs & Co.*	808.00
Chas. H. Pleasants	814.25
H. T. Wakeman	856.75
J. B. Morrell & Co	855.00
Class 58—Continued.	
Harry L. Briggs	$911.05
R. A. Robbins	897.00
Class 59:	
Chas. M. Childs & Co.*	353.25
Chas. H. Pleasants	378.00
Morse Burtis	378.00
J. B. Morrell & Co	372.00
Harry L. Briggs	371.40
R. A. Robbins	396.00
Class 60:	
Chas. M. Childs & Co	52.60
Tissot & Schults	98.65
Morse Burtis	82.55
H. T. Wakeman	92.20
J. B. Morrell & Co.*	47.75
Harry L. Briggs	87.00
R. A. Robbins	85.60
Class 61:	
Chas. H. Pleasants*	389.00
Class 69:	
Tissot & Schults	223.22
Chas. H. Pleasants	132.96
J. B. Morrell & Co	95.60
R. A. Robbins*	71.80
Class 70:	
Tissot & Schults	274.46
J. B. Morrell & Co	244.34
Harry L. Briggs*	121.58
R. A. Robbins	134.00
Class 78:	
J. B. Morrell & Co	107.20
Harry L. Briggs	118.00
R. A. Robbins*	103.36
Class A:	
Carnegie, Phipps & Co., *per pound.	.04½
Class B:	
Carnegie, Phipps & Co., *per pound.	.04½
Class C:	
Carnegie, Phipps & Co., *per pound.	.04½
Class D:	
J. H. Sternbergh & Son*	$3,867.50
Class E:	
Carnegie, Phipps & Co., *per pound.	.04½
Class H:	
Carnegie, Phipps & Co., *per pound.	.04½
Class I:	
J. H. Sternbergh & Son*	389.69
Class K:	
Carnegie, Phipps & Co., *per pound.	.04½
Class L:	
Carnegie, Phipps & Co., *per pound.	.04½

Proposals for stores for the Concord, Bennington, and Philadelphia, and lumber, etc., for the New York navy-yard, under Bureau advertisement, dated August 21, 1890; opened September 16, 1890.

Class A:	
E. L. Richardson	$1,725.00
Joseph W. Duryee	1,900.00
Watson & Pittinger	1,975.00
Lewis H. Ross	3,875.00
John McClave*	1,615.00
Class B:	
R. A. Robbins*	1,008.60
Thomas F. Carney	1,014.00
Class C:	
Joseph W. Duryee	5,047.00
Eppinger & Russell	5,034.50
Watson & Pittinger*	4,944.00
John McClave	5,712.00
Class D:	
Joseph W. Duryee*†	85.00
Watson & Pittinger	87.50
Lewis H. Ross	91.25
John McClave	85.00
Class E:	
J. B. Morrell & Co.*	96.70
Class E—Continued.	
R. A. Robbins	$118.00
Harry L. Briggs	102.00
James W. Soper	103.76
Class F:	
R. A. Robbins*	1,492.70
Class G:	
J. B. Morrell & Co	352.24
S. C. Forsaith Machine Co	350.95
J. H. Sternbergh & Son*	300.05
R. A. Robbins	334.60
Harry L. Briggs	362.63
Class H:	
Joseph W. Duryee*	200.00
Class I:	
J. B. Morrell & Co.*	7,886.71
R. A. Robbins	8,112.90
Woodward & Lothrop	8,239.55
Class K:	
Stevenson Brothers & Co	80.00
J. B. Morrell & Co	84.04

*Accepted.

†Decided by lot.

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Proposals for stores for the Concord, Rennington, and Philadelphia, and lumber, etc., for the New York navy-yard, etc.—Continued.

Class K—Continued.	
R. A. Robbins*	$61.60
Harry L. Briggs	84.00
Class L:	
Joseph W. Duryee	422.50
Lewis H. Ross	312.12
John McClave*	260.00
Class M:	
Charles H. Pleasant*	69.04
R. A. Robbins	74.90
Harry L. Briggs	84.80
Class N:	
Charles H. Pleasants	173.32
J. B. Morrell & Co	180.92
R. A. Robbins	171.40
Harry L. Briggs	169.62
James W. Soper*	158.62
Class O:	
R. A. Robbins*	371.60
Woodward & Lothrop	379.21
Class P:	
S. C. Forsaith Machine Co	5,016.89
R. A. Robbins	4,853.42
Temple & Lockwood	5,375.32
Harry L. Briggs	4,925.94
James W. Soper*	4,768.12
Class Q:	
Mercer Rubber Co	100.00
Stevenson Brothers & Co	105.00
Charles H. Pleasants	69.95
J. B. Morrell & Co	90.00
Alexander C. Oliphant	75.00
R. A. Robbins	64.50
Class Q—Continued.	
Burditt & Williams	$75.00
Harry L. Briggs*	52.50
Class R:	
Charles H. Pleasants	127.30
H. T. Wakeman	131.20
S. C. Forsaith Machine Co	126.55
R. A. Robbins	126.00
Burditt & Williams	148.98
Harry L. Briggs	138.00
James W. Soper*	113.45
Class S:	
R. A. Robbins*	2,471.58
Harry L. Briggs	2,705.02
Class T:	
R. A. Robbins*	82.00
Class U:	
Stevenson Brothers & Co.†	124.00
Vacuum Oil Co.*	324.00
Rowland A. Robbins	336.00
Class V:	
S. C. Forsaith Machine Co*	904.00
R. A. Robbins	1,289.00
Class W:‡	
Harry L. Briggs	383.25
Class X:‡	
Charles H. Pleasants	447.62
Charles M. Childs	452.38
J. B. Morrell & Co	481.50
Harry L. Briggs	503.65
Class Y:‡	
Charles H. Pleasants	102.60

Proposals for bedsteads for the Naval Academy, under Bureau advertisement dated August 22, 1890; opened September 16, 1890.

Class 21:	
Hartford Woven Wire Mattress Co	$1,755.00
John F. Lovejoy & Co	2,308.00
Class 21—Continued.	
William F. Bernstein*	$1,433.80
R. A. Robbins	1,992.00

Proposals for fencing material, paints, etc., for the naval station, New London, Conn., under Bureau advertisement dated September 1, 1890; opened September 16, 1890.

Class A:	
R. A. Robbins	$104.42
Chaney & Latham	80.91
Burditt & Williams	108.08
Nathan S. Gallup	91.94
George M. Williams*	75.10
Class B:	
Burditt & Williams	247.00
Nathan S. Gallup*	175.50
George M. Williams	202.50
Class C:	
R. A. Robbins	1,271.31
Chaney & Latham	725.36
Class C—Continued.	
Burditt & Williams	$955.65
Nathan S. Gallup*	460.85
George M. Williams	548.28
Class D:	
J. B. Morrell & Co	215.20
Charles H. Pleasants	214.91
Chaney & Latham	240.97
Burditt & Williams	271.50
Nathan S. Gallup	249.53
Chas. M. Childs & Co*	206.57
George M. Williams	237.32

Proposals for lumber for the Washington navy-yard, under Bureau advertisement dated September 1, 1890; opened September 16, 1890.

Class 36:	
George L. Neville	$1,656.68
Perry & Son †	863.70
Class 36—Continued.	
Joseph W. Duryee*	$1,068.84
W. W. McCullough	1,430.00

Proposals for building material, equipment, and constructors' stores, etc., for the Mare Island navy-yard, under Bureau advertisement dated August 30, 1890; opened September 16, 1890.

Class A:	
Wm. Walker	$3,276.65
A. S. Carman*	2,768.31
A. Powell	2,918.16
Class B:	
Dunham, Carrigan & Hayden Co.*.	53.55
Class C:	
S. C. Forsaith Machine Co	$17.10
Dunham, Carrigan & Hayden Co.*.	15.00
Chas. H. Pleasants	20.88
Class D:	
Wm. P. Fuller, jr	2,636.84

* Accepted. † Informal. ‡ Class not awarded.

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Proposals for building material, equipment, and constructors' stores, etc.—Continued.

Class D—Continued.	
Chas. M. Yates*	$2,570.26
Chas. H. Pleasants	3,086.40
Class E:	
Rowland A. Robbins*	4,185.72
Class F:	
R. A. Robbins	554.25
Cunningham, Curtis & Welch*	462.56
Class G:	
Wm. Walker	367.68
A. S. Carman*	300.82
A. Powell	317.54
Class H:	
Wm. Walker	219.52
Chas. H. Pleasants	229.24
Class H—Continued.	
A. Powell	$248.40
James W. Soper*	180.00
Class I:	
R. A. Robbins*	150.10
Cunningham, Curtis & Welch	221.00
Class K:	
S. C. Forsaith Machine Co	1,275.00
R. A. Robbins	1,375.00
Dunham, Carrigan & Hayden Co	1,200.00
Chas. H. Pleasants*	1,163.75
Class L:	
S. C. Forsaith Machine Co.*	286.25
R. A. Robbins	900.00
Chas. H. Pleasants	337.50

Proposals for coal for the naval hospital, Mare Island, California, under Bureau advertisement dated August 25, 1890; opened September 16, 1890.

Class 20:	
Henry Rosenfeld*	$3,642.00
Class 20—Continued.	
Wm. Walker	$4,803.00

Proposals for machine tools for the New York navy-yard, under Bureau advertisement dated August 25, 1890; opened September 16, 1890.

Class 1:	
S. C. Forsaith Machine Co	$7,318.00
Niles Tool Works	7,344.00
George Place	8,400.00
William Sellers & Co.*	5,460.00
Manning, Maxwell & Moore	6,950.00
Class 2:	
S. C. Forsaith Machine Co.*	3,351.00
Niles Tool Works	3,938.00
George Place	3,700.00
William Sellers & Co	3,900.00
Manning, Maxwell & Moore	3,750.00
Class 3:	
S. C. Forsaith Machine Co	14,252.00
Universal Radial Drill Co	10,200.00
Niles Tool Works	9,190.00
George Place*	8,400.00
William Sellers & Co	14,000.00
Manning, Maxwell & Moore	10,800.00
Class 4:	
S. C. Forsaith Machine Co.*	1,787.00
Niles Tool Works	2,500.00
George Place	1,850.00
Manning, Maxwell & Moore†	1,695.00
Class 5:	
Niles Tool Works	2,250.00
William Sellers & Co	910.00
Manning, Maxwell & Moore*	775.00
Class 6:	
S. C. Forsaith Machine Co.*	121.50
Gustave E. De Reisthal	125.00
Class 7:	
Niles Tool Works†	1,900.00
John F. Lovejoy & Co	2,950.00
R. A. Robbins*	2,749.00
Manning, Maxwell & Moore†	2,530.00
Class 8:	
Niles Tool Works†	3,450.00
John F. Lovejoy & Co	4,200.00
R. A. Robbins*	3,768.00
Manning, Maxwell & Moore†	3,612.00
Class 9:	
The Bridgeport Machine Tool Works†	2,628.00
Niles Tool Works†	2,900.00
John F. Lovejoy & Co	3,600.00
R. A. Robbins*	3,244.00
Manning, Maxwell & Moore	4,040.00
Class 10:	
John F. Lovejoy & Co	$1,230.00
R. A. Robbins*	1,108.00
Manning, Maxwell & Moore†	750.00
Class 11:	
Manning, Maxwell & Moore*	297.00
Class 12:	
S. C. Forsaith Machine Co	227.34
John F. Lovejoy & Co	248.00
R. A. Robbins	224.80
Manning, Maxwell & Moore*	200.00
Class 13:	
The Yale & Towne Manufacturing Co.*	888.00
S. C. Forsaith Machine Co	918.00
Class 14:	
The Yale & Towne Manufacturing Co.*	870.00
S. C. Forsaith Machine Co	894.00
Class 15:	
John F. Lovejoy & Co	1,357.50
R. A. Robbins*	1,301.80
Class 16:	
Dwight F. Walker	575.00
S. C. Forsaith Machine Co	600.66
Manning, Maxwell & Moore*	393.95
Class 17:	
S. C. Forsaith Machine Co.*	347.50
John F. Lovejoy & Co	378.00
R. A. Robbins	354.48
Class 18:	
S. C. Forsaith Machine Co.*	321.45
John F. Lovejoy & Co	340.00
R. A. Robbins	332.00
Manning, Maxwell & Moore	350.00
Class 19:	
The Electric Dynamic Co.*	311.80
Class 20:	
Thomas H. Dallett & Co.*	795.00
Class 21:	
Thomas H. Dallett & Co.*	525.00
Electro Dynamic Co	750.00
Class 22:	
Universal Radial Drill Co.*	740.00
George Place	1,238.00
Class 23:	
Tinnius, Olsen & Co.†	1,073.00
Riehle Brothers*	1,707.00

* Accepted.

† Informal.

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Proposals for machine tools for the Norfolk navy-yard under Bureau advertisement dated August 23, 1890, opened September 16, 1890.

Class 1:	
Dwight F. Walker*	$2,098.00
George Place	2,350.00
Niles Tool Works	2,520.00
Class 2:	
John F. Lovejoy & Co	1,000.00
Brown & Sharpe Manuf'g Co.*	928.00
R. A. Robbins	973.00
Manning, Maxwell & Moore†	690.00
Niles Tool Works	1,005.00
Class 3:	
George L. Neville	736.25
George Place	732.25
S. C. Forsaith Machine Co	723.26
John F. Lovejoy & Co	639.00
Norfolk Supply Co	736.25
R. A. Robbins*	593.75
Curtis & Curtis	732.25
Class 4:	
Bridgeport Machine Tool Works	780.00
Fitchburg Machine Works*	730.00
George L. Neville	775.00
Putnam Machine Co	774.00
John F. Lovejoy & Co	940.00
R. A. Robbins	855.00
Niles Tool Works	795.00
Class 5:	
Bridgeport Machine Tool Works	940.00
Fitchburg Machine Works	960.00
George L. Neville	1,100.00
Putnam Machine Co	1,072.00
John F. Lovejoy & Co	1,200.00
R. A. Robbins	1,118.00
Manning, Maxwell & Moore*	700.00
Class 6:	
Fitchburg Machine Works*	430.00
George L. Neville	550.00
Putnam Machine Co	508.00
John F. Lovejoy & Co	490.00
R. A. Robbins	454.00
Class 7:	
George L. Neville	350.00
Ira B. White	219.75
John F. Lovejoy & Co	175.90
R. A. Robbins*	167.00
Class 8:	
Fitchburg Machine Works*	264.00
George L. Neville	350.00
John F. Lovejoy & Co	330.00
R. A. Robbins	290.00
Class 9:	
George L. Neville	350.00
Putnam Machine Co.*	330.00
Class 10:	
Dwight F. Walker	600.00
George L. Neville	650.00
Putnam Machine Co.*	600.00
Class 11:	
Dwight F. Walker	294.00
Fitchburg Machine Works	345.00
George Place	320.00
S. C. Forsaith Machine Co.*	234.50
Niles Tool Works	275.00
Class 12:	
George L. Neville	475.00
S. C. Forsaith Machine Co.*	348.18
John F. Lovejoy & Co	390.00
R. A. Robbins	367.00
Niles Tool Works	425.00
Class 13:	
George L. Neville	550.00
S. C. Forsaith Machine Co.*	396.00
Class 14:	
George L. Neville	375.00
John F. Lovejoy & Co	290.00
Brown & Sharpe Manufacturing Co	275.00
R. A. Robbins*	247.00
Class 15:	
James W. Soper	221.52
George L. Neville	202.00
S. C. Forsaith Machine Co	303.97
John F. Lovejoy & Co	284.00
Norfolk Supply Co	216.95
Class 15—Continued.	
R. A. Robbins	$223.00
Class 16:	
George Place	2,850.00
Niles Tool Works*	2,700.00
Class 17:	
George Place*	1,400.00
Class 18:	
George Place*	600.00
S. C. Forsaith Machine Co	667.50
Class 20:	
George L. Neville	299.49
George Place	305.00
S. C. Forsaith Machine Co	313.37
Ira B. White	347.00
Donegan & Swift*	242.60
Manning, Maxwell & Moore	337.50
Class 21:	
George L. Neville*	624.00
George Place	644.00
S. C. Forsaith Machine Co	647.00
Manning Maxwell & Moore	675.00
Class 22:	
Yale & Towne Manufacturing Co.*	2,100.00
Ira B. White	2,194.50
Class 23:	
Billany & Cochrane	290.25
George L. Neville	304.00
S. C. Forsaith Machine Co	281.18
Ira B. White	280.50
Manning, Maxwell & Moore*	247.00
Class 24:	
Billany & Cochrane	188.94
James W. Soper	203.82
George L. Neville	238.20
S. C. Forsaith Machine Co	217.68
Ira B. White	217.40
Norfolk Supply Company	224.40
R. A. Robbins*	173.38
Manning Maxwell & Moore	192.90
Class 25:	
Billany & Cochrane*	295.34
James W. Soper	308.08
George L. Neville	285.00
S. C. Forsaith Machine Co	318.32
Norfolk Supply Co	465.76
R. A. Robbins	296.00
Class 26:	
Billany & Cochrane	388.93
George L. Neville*	381.39
S. C. Forsaith Machine Co	413.11
John F. Lovejoy & Co	421.50
Norfolk Supply Co	397.72
R. A. Robbins	384.30
Manning, Maxwell & Moore	392.76
Class 27:	
Billany & Cochrane	498.97
George L. Neville*	437.40
S. C. Forsaith Machine Co	553.18
John F. Lovejoy & Co	585.40
Norfolk Supply Co	662.04
R. A. Robbins	542.90
Manning, Maxwell & Moore	473.97
Class 28:	
Billany & Cochrane	78.24
James W. Soper	85.58
Geo. L. Neville	84.80
S. C. Forsaith Machine Co	90.40
Ira B. White	83.10
John F. Lovejoy & Co	85.70
Norfolk Supply Co	84.44
R. A. Robbins	81.44
Manning, Maxwell & Moore*	76.30
Class 29:	
Billany & Cochrane*	168.40
Geo. L. Neville	172.81
S. C. Forsaith Machine Co	209.00
John F. Lovejoy & Co	188.25
Brown & Sharpe Manufacturing Company	212.45
R. A. Robbins	183.09
Manning, Maxwell & Moore	178.79
Class 30:	
Geo. L. Neville	281.00

* Accepted.

† Informal.

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Proposals for machine tools for the Norfolk navy-yard, etc.—Continued.

Class 30—Continued.	
S. C. Forsaith Machine Co	$219.60
John F. Lovejoy & Co	219.80
R. A. Robbins*	205.40
Manning, Maxwell & Moore	206.58
Class 31:	
James W. Soper	576.35
Geo. L. Neville	520.00
S. C. Forsaith Machine Co*	483.75
John F. Lovejoy & Co	531.70
Norfolk Supply Company	521.79
R. A. Robbins	489.11
Manning, Maxwell & Moore	519.74
Class 32:	
Geo. L. Neville	665.80
S. C. Forsaith Machine Co	737.17
John F. Lovejoy & Co	822.00
Norfolk Supply Co	724.41
R. A. Robbins	736.90
H. L. Shippey*	640.01
Wm. Sellers & Co	679.81
Class 33:	
Geo. Place	1,045.00
S. C. Forsaith Machine Co*	939.65
Egan Company	1,000.00
Niles Tool Works	1,062.00
Class 34:	
Dwight F. Walker	573.00
Geo. Place	457.00
Egan Company*	400.00
Niles Tool Works	510.00
Class 35:	
Geo. Place	458.00
S. C. Forsaith Machine Co	394.00
Egan Company	400.00
Niles Tool Works*	376.00
Class 36:	
Geo. Place	473.00
Egan Company*	350.00
Class 37:	
Dwight F. Walker	412.00
Geo. L. Neville	500.00
Geo. Place	460.00
Greenlie Bros. & Co	375.00
Egan Company*	290.00
S. C. Forsaith Machine Co	426.00
Class 38:	
Geo. Place	347.00
Egan Company*	265.00
Class 39:	
Dwight F. Walker	248.00
Geo. L. Neville	300.00
Geo. Place	347.00
Class 39—Continued.	
S. C. Forsaith Machine Co	$223.50
Greenlie Bros. & Co	225.00
Egan Company*	210.00
Class 40:	
Dwight F. Walker	130.00
George Place	207.00
S. C. Forsaith Machine Company*	108.75
Egan Company	200.00
Class 41:	
George Place	190.00
S. C. Forsaith Machine Company*	122.00
Egan Company	155.00
Niles Tool Works	153.00
Class 42:	
Dwight F. Walker	100.75
George L. Neville	98.00
S. C. Forsaith Machine Company*	67.00
Egan Company	105.00
Class 43:	
Dwight F. Walker	100.00
George L. Neville	120.00
Norfolk Supply Company	99.00
Class 44:	
George L. Neville	225.00
George Place*	129.00
S. C. Forsaith Machine Company	154.50
Egan Company	200.00
Class 45:	
George Place	524.00
Egan Company*	350.00
Class 46:	
George L. Neville	225.00
George Place	174.00
S. C. Forsaith Machine Company*	146.00
Egan Company	175.00
Class 47:	
George Place	295.00
S. C. Forsaith Machine Company*	133.42
Egan Company	220.00
Class 48:	
S. C. Forsaith Machine Company	114.25
Ira B. White	88.00
John F. Lovejoy & Co	99.00
R. A. Robbins	88.20
Niles Tool Works*	85.00
Class 49:	
Electro-Dynamic Company	7,357.85
Thomas H. Dallett & Co*	5,698.10
Class 50:	
George L. Neville	1,169.00
S. C. Forsaith Machine Company*	985.22
Stowe Flexible Shaft Company	997.50

Proposals for windlasses, steering engine, etc., for the Norfolk navy-yard under Bureau advertisement dated September 1, 1890, opened September 16, 1890.

Class 2:	
American Ship Windlass Co.*	$15,750.00
Class 59:	
Williamson Brothers*	4,550.00
Class 20:	
George L. Neville	$750.00
Nottingham & Wrenn*	472.50

Proposals for engineering and constructor's stores, etc., for the New York navy-yard under Bureau advertisement dated September 1, 1890, opened September 16, 1890.

Class A:	
Harry L. Briggs	$978.00
J. B. Morrell & Co	942.50
Joseph Wechsler	990.00
R. A. Robbins*	918.00
Charles H. Pleasants	989.70
Tissot & Schultz	1,038.75
Class B:	
Harry L. Briggs	83.50
J. B. Morrell & Co	100.00
R. A. Robbins*	63.38
S. C. Forsaith Machine Company	86.95
Tissot & Schultz	79.50
Class C:	
Joseph W. Duryee*	$152.50
Class D:	
Harry L. Briggs	97.80
J. B. Morrell & Co	94.20
R. A. Robbins*	71.45
Charles H. Pleasants	92.08
Class E:	
Harry L. Briggs	323.73
J. B. Morrell & Co	325.97
R. A. Robbins*	324.52
Charles H. Pleasants*	299.37

*Accepted.

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Proposals for engineering and constructors' stores, etc., for the New York navy-yard, etc.—Continued.

Class F:	
F. Foehrenbach & Co.*	$2,630.70
Class G:†	
R. A. Robbins	6,000.00
Class H:	
Joseph W. Duryee*	4,898.00
Class I:	
Harry L. Briggs	1,021.65
J. B. Morrell & Co.*	932.22
Thornton N. Motley	952.60
Charles M. Childs & Co.‡	903.75
Charles H. Pleasants	934.52
Class K:	
J. B. Morrell & Co.*	359.11
R. A. Robbins	411.59
Class L:	
J. B. Morrell & Co	5,036.60
Class L—Continued.	
Thornton N. Motley	$5,100.00
R. A. Robbins*	4,727.30
Woodward & Lothrop	4,991.18
Class M:	
Harry L. Briggs	90.00
J. B. Morrell & Co.*	79.00
R. A. Robbins	83.25
Charles H. Pleasants	90.50
Tissot & Schultz	87.00
Class N:	
Harry L. Briggs	396.00
Thornton N. Motley*	384.00
R. A. Robbins	420.00
S. C. Forsaith Machine Company	447.00

Proposals for stationery and drafting material for the Bath Iron Works, Bath, Me., under Bureau advertisement dated August 28, 1890, opened September 16, 1890.

Class 30:	
John O. Shaw	$333.05
John F. Lovejoy & Co	231.44
R. A. Robbins*	221.15
Class 61:	
John O. Shaw*	$298.03
John F. Lovejoy & Co	364.93
R. A. Robbins	311.93

Proposals for lumber, building material, constructor's stores, etc., for the Portsmouth Navy-yard under Bureau advertisement dated August 28, 1890, opened September 16, 1890.

Class A:	
R. A. Robbins	$1,673.06
Burditt & Williams*	1,578.22
Class B:	
R. A. Robbins*	70.40
Burditt & Williams	109.95
Class C:	
R. A. Robbins*	104.00
Class D:	
J. W. Gaskill & Sons	1,011.50
Geo. A. Hammond	1,075.00
John H. Broughton	1,065.00
Joseph W. Duryee*	851.00
Class E:	
Chas. H. Pleasants	1,014.58
Gould & Cutler*	1,000.30
Class F:	
R. A. Robbins	187.89
Chas. H. Pleasants	192.23
James W. Soper*	162.10
Burditt & Williams	236.20
Class G:	
R. A. Robbins	51.00
Class G—Continued.	
Chas. H. Pleasants*	$50.95
Class H:	
J. W. Gaskill & Sons	406.00
Geo. A. Hammond	392.00
John H. Broughton*	308.00
Joseph W. Duryee	420.00
Class I:	
Eli W. Rowe	7,707.50
R. A. Robbins	8,338.75
John H. Broughton*	7,197.50
Class K:	
R. A. Robbins*	200.78
Class L:	
J. W. Gaskill & Sons	732.00
John H. Broughton*	627.50
Joseph W. Duryee	671.00
Class N:	
Geo. Willett Andrews*	1,141.17
Class O:	
J. W. Gaskill & Sons*	2,702.58
John H. Broughton	2,757.97
Joseph W. Duryee	3,018.75

Proposals for sheet rubber for the League Island navy-yard under Bureau advertisement dated September 1, 1890 opened September 16, 1890.

Class 51:	
Mercer Rubber Co	$350.00
R. A. Robbins	392.00
Class 51—Continued.	
Melville Lindsay	$521.50
Wm. Heaton*	329.00

Proposals for equipment stores for the Boston navy-yard under Bureau advertisement dated August 29, 1890, opened September 16, 1890.

Class 13:	
R. A. Robbins*	$133.60
Class 14:	
R. A. Robbins*	3,487.50
Woodward & Lothrop	3,922.05
Class 15:	
S. C. Forsaith Machine Company	768.00
Burditt & Williams*	645.60
Class 19:	
R. A. Robbins*	$394.20
J. B. Morrell & Company	395.30
Class 20:	
Boston Gaslight Company*	415.00
Burditt & Willams	450.00
R. A. Robbins	490.00
John Mullett	430.00

*Accepted. †No award. ‡Informal.

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Proposals for equipment stores for the Boston navy-yard, etc.—Continued.

Class 43:	
S. C. Forsaith Machine Company *	$192.63
Burditt & Williams	208.50
R. A. Robbins	218.00
Class 53:	
S. C. Forsaith Machine Company	73.45
Burditt & Williams	83.18
R. A. Robbins *	70.88
Class 59:	
Abraham F. Underwood†	571.30
James W. Soper *	574.90
S. C. Forsaith Machine Company	582.75
Class 59—Continued.	
R. A. Robbins	$649.90
J. B. Morrell & Co	615.00
Class 69:	
S. C. Forsaith Machine Company*	4,133.00
R. A. Robbins	4,198.10
Class 71:	
S. C. Forsaith Machine Company*	38,805.48
R. A. Robbins	42,797.35
Geo. W. Lawrence	48,875.50
Class 27:	
Lawrence Wilde & Company *	290.23

Proposals for material for the U. S. battle ship Texas, navy-yard, Norfolk, Va., under Bureau advertisement dated September 1, 1890; opened September 16, 1890.

Class 5:	
Geo. L. Neville	$380.00
A. A. McCullough*	308.75
Class 6:	
Geo. L. Neville	200.00
A. A. McCullough*	125.00
Class 7:	
Geo. L. Neville*	600.00
A. A. McCullough	900.00
Class 8:	
Joseph W. Duryee	2,115.60
Geo. L. Neville	2,115.60
A. A. McCullough*	1,763.00
Class 10:	
Joseph W. Duryee	8,073.00
Geo. L. Neville	7,452.00
A. A. McCullough*	6,831.00
Class 11:	
Geo. L. Neville	675.00
A. A. McCullough*	450.00
Class 13:	
Joseph W. Duryee*	9,351.00
Geo. L. Neville	10,860.00
A. A. McCullough	10,335.00
Class 15:	
Joseph W. Duryee	2,798.70
Geo. L. Neville*	2,365.00
A. A. McCullough	3,169.00
Class 18:	
Joseph W. Duryee*	1,449.00
Geo. L. Neville	1,732.00
A. A. McCullough	1,925.50
Class 22:	
Geo. L. Neville*	525.00
A. A. McCullough	600.00
Class 23:	
Geo. L. Neville*	300.00
A. A. McCullough	371.00
Class 31:	
R. A. Robbins*	1,009.50
Geo. L. Neville	1,249.00
Class 32:	
R. A. Robbins*	358.00
Geo. L. Neville	564.50
Class 33:	
Thornton N. Motley	399.00
Ira B. White*	248.98
R. A. Robbins	290.60
Geo. L. Neville	470.04
Class 35:	
Thornton N. Motley	11.25
R. A. Robbins*	6.75
Geo. L. Neville	15.00
Class 37:	
J. H. Sternbergh & Son*	1,834.00
R. A. Robbins	2,040.41
Geo. L. Neville	3,455.75
Class 39:	
Ira B. White	90.85
R. A. Robbins*	89.50
Geo. L. Neville	91.23
Class 42:	
Ira B. White	639.20
R. A. Robbins	625.02
Geo. L. Neville*	596.60
Class 43:	
Thornton N. Motley	128.00
Class 43—Continued.	
Ira B. White	$160.00
R. A. Robbins	134.00
Geo. L. Neville *	124.00
Class 44:	
Thornton N. Motley	1,230.00
Ira B. White	1,345.00
R. A. Robbins	1,219.50
Geo. L. Neville*	1,175.00
Class 45:	
Thornton N. Motley	7.00
Ira B. White	7.25
R. A. Robbins *	5.10
Geo. L. Neville	6.25
Class 49:	
Thornton N. Motley	540.66
Ira B. White	518.58
R. A. Robbins	511.10
Geo. L. Neville*	487.70
Class 54:	
Ira B. White	10,518.03
R. A. Robbins*	10,081.17
Geo. L. Neville	13,784.28
Class 56:	
Thornton N. Motley	198.00
Ira B. White	207.00
Chas. M. Childs & Co	202.20
R. A. Robbins*	192.00
Geo. L. Neville	208.50
Class 57:	
Thornton N. Motley	124.00
Ira B. White	148.00
Chas. M. Childs & Co	119.60
R. A. Robbins	124.00
Geo. L. Neville *	110.00
Class 58:	
Thornton N. Motley	1,115.00
Ira B. White	642.00
Chas. M. Childs & Co	631.30
Geo. L. Neville*	622.25
Class 59:	
Thornton N. Motley	126.00
Ira B. White	125.00
Chas. M. Childs & Co. *	119.00
R. A. Robbins	136.00
Geo. L. Neville	120.00
Class 60:	
Thornton N. Motley	90.00
Ira B. White	88.00
Chas. M. Childs & Co	87.50
Geo. L. Neville*	84.00
Class 68:	
R. A. Robbins	487.90
Geo. L. Neville *	402.72
Class 69:	
Ira R. White	103.20
R. A. Robbins*	76.50
Geo. L. Neville	78.07
Class 86:	
Ira B. White	38.00
R. A. Robbins	58.60
Geo. L. Neville*	30.00
Class 88:	
Ira B. White *	82.50
R. A. Robbins	100.00
Geo. L. Neville	90.00
Class 90:	
Williamson Bros*	4,925.00

* Accepted.

† Informal.

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Proposals for butter for the New York navy-yard, under Bureau advertisement dated September 9, 1890; opened September 23, 1890.

15,000 pounds butter (per pound):			
Thurber, Whyland & Co.*	0.28\frac{88}{100}$	Simpson, McIntire & Co	$0.32

Proposals for lumber, stationery, etc., for Pensacola navy-yard, under Bureau advertisement dated September 1, 1890; opened September 16, 1890.

Class A:		Class C—Continued.	
John W. Woolfolk	$115.20	Rowland A. Robbins*	$120.30
Rowland A. Robbins	131.80	Jeremiah O'Neal	142.50
Jeremiah O'Neal	128.50	John J. Keefe	142.70
T. J. McKenzie Oerting*	103.97	T. J. McKenzie Oerting	141.70
Class B:		Class D:	
John W. Woolfolk	95.79	John W. Woolfolk	248.10
Rowland A. Robbins	131.37	Jeremiah O'Neal*	212.00
Jeremiah O'Neal	109.65	Class E:	
John J. Keefe*	84.80	John W. Woolfolk	204.51
T. J. McKenzie Oerting	87.99	Jeremiah O'Neal	211.05
Class C:		T. J. McKenzie Oerting*	192.85
John W. Woolfolk	141.55		

Proposals for coal for the naval training station, Newport, R. I., under Bureau advertisement dated September 11, 1890; opened September 30, 1890.

Class 20:		Class 20—Continued.	
David Duncan & Son	$3,406.00	Gardiner B. Reynolds	$3,267.50
Samuel G. French*	3,111.00		

Proposals for paints, etc., for the Naval Academy, under Bureau advertisement dated September 12, 1890; opened September 30, 1890.

Class A:		Class B—Continued.	
James W. Soper	$84.87	Gould & Cutler Corporation	$556.15
J. B. Morrell & Co.*	78.27	J. B. Morrell & Co	554.35
Class B:		Charles H. Pleasants*	501.84
Charles M. Childs & Co	520.58	Shanahan & Reilly	575.94

Proposals for shaping-machinery for the Washington navy-yard under Bureau advertisement September 15, 1890, opened September 30, 1890.

Class 38:		Class 38—Continued.	
George Place*	$1,239.00	S. C. Forsaith, Machine Company	$1,549.00
Wm. H. Warren	1,750.00	Niles Tool Works	1,343.00

Proposals for canvas for the Portsmouth navy-yard under Bureau advertisement September 13, 1890, opened September 30, 1890.

Class 14:		Class 14—Continued.	
Tissot & Schultz	$1,240.50	Woodward & Lothrop	$1,190.70
J. B. Morrell & Co	1,143.00	Wm. D. Clarke	1,275.00
Geo. S. Neville*	1,130.00	S. C. Forsaith Machine Company	1,234.00

Proposals for hoisting engine for the League Island navy-yard under Bureau advertisement September 10, 1890 opened September 30, 1890.

Class A:		Classs A—Continued.	
Henry I. Snell	$634.00	S. C. Forsaith Machine Company*.	$585.00
Williamson & Bros	641.00		

Proposals for salt-water soap for the New York navy-yard under Bureau advertisement September 23, 1890, opened October 7, 1890.

125,000 pounds salt-water soap (per pound):		125,000 pounds salt-water soap (per pound)—Continued.	
George H. Conant	0.04\frac{8}{10}$	Richd. M. Colgate	0.05\frac{42}{100}$
Chas. McKeone*	.03$\frac{33}{100}$	Harry L. Briggs	.03$\frac{14}{100}$

* Accepted.

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Proposals for lumber, etc., for the Mare Island navy-yard under Bureau advertisement September 18, 1890, opened October 7, 1890.

Class A:	
Chas. H. Pleasants*	$169.55
Rowland A. Robbins	246.51
John T. Lovejoy & Co	263.85
H. S. Crocker	196.42
Payot, Upham & Co	213.47
Henry Kahn & Co	179.27
Class B:	
Rowland A. Robbins*	226.21
John F. Lovejoy & Co	257.83
H. S. Crocker	254.00
Payot, Upham & Co	248.90
Class C:	
Dunham, Carrigan & Hayden Co	116.10
Hawley Bros. Hardware Company*	106.00
Class D:	
S. C. Forsaith Machine Company	34.73
Billany & Cochrane*	29.34
Dunham, Carrigan & Hayden Co.	33.00
Class E:	
Chas. H. Pleasants	239.80
Wm. P. Fuller, jr.*	182.75
Class F:	
Carolan & Co	676.50
Jas. W. Soper*	602.73
J. B. Morrell & Co	679.04
Billamy & Cochrane	650.50
Dunham, Carrigan & Hayden Co.	646.83
Class F—Continued.	
Hawley Bros. Hardware Company	$674.44
Class G:	
Chas. H. Pleasants*	14.88
J. B. Morrell & Co	17.10
Rowland A. Robbins	18.00
John F. Lovejoy & Co	21.00
Hawley Bros. Hardware Company.	18.90
Class H:	
A. Powell*	3,115.19
A. S. Carman	3,267.69
William Walker	3,140.10
Class I:	
Dunham, Carrigan & Hayden Co.*	540.50
Geo. W. Gibbs†	387.75
Carolan & Co.†	369.75
Class K:	
A. Powell*	35.32
A. S. Carman	38.33
Wm. Walker	39.60
Class L:	
Dunham, Carrigan & Hayden Co.	52.55
Hawley Bros. Hardware Company*	49.34
Class M:	
S. C. Forsaith Machine Company	645.94
Dunham, Carrigan & Hayden Co.*	366.60
Class N:	
Dunham, Carrigan & Hayden Co.*	164.00

Proposals for building material for the Boston navy-yard under Bureau advertisement dated September 16, 1890, opened October 7, 1890.

Class A:	
Ansel W. Paine	$50.00
George L. Neville	50.00
Charles H. Pleasants	45.10
Rowland A. Robbins	45.00
Gould & Cutler, corporation*	41.00
Class B:	
Fairbanks & Co.*	142.90
R. A. Robbins	159.41
Class C:	
Ansel W. Paine	229.50
Fiske, Coleman & Co.*	170.80
Class D:	
Ansel W. Paine*	61.80
Class E:	
Bolles & Wilde	42.00
Ansel W. Paine	44.10
Charles H. Pleasants	46.80
Gould & Cutler*	25.36
Class F:	
Bolles & Wilde*	69.47
Ansel W. Paine	73.34
Class G:	
Ansel W. Paine	435.00
J. O. Wetherbee*	275.00
Class H:	
Ansel W. Paine*	57.50
Class H—Continued.	
George L. Neville	$200.00
Charles H. Pleasants	97.90
R. A. Robbins	104.00
J. B. Morrell & Co	75.00
Class I:	
Ansel W. Paine	117.40
Charles H. Pleasants	96.73
E. F. King & Co.*	91.45
J. B. Morrell & Co	101.65
Gould & Cutler	94.75
Class K:	
Ansel W. Paine	150.00
Charles H. Pleasants	159.00
R. A. Robbins	203.00
S. C. Forsaith Machine Company*	139.75
Class L:	
Bolles & Wilde*‡	97.50
Ansel W. Paine	105.00
George L. Neville	104.70
Charles H. Pleasants	100.20
R. A. Robbins	103.50
J. B. Morrell & Co	105.00
S. C. Forsaith Machine Company	97.50
Class M:	
Ansel W. Paine*	200.00

Proposals for furniture, engineering stores, etc., for the New York navy-yard under Bureau advertisment dated September 17, 1890, opened October 7, 1890.

Class B:	
S. C. Forsaith Machine Company*.	$438.75
Class C:	
Lewis H. Ross*	936.00
Joseph W. Duryee	1,267.50
Class D:	
Wm. McDonagh*	719.26
J. B. Morrell & Co	731.28
Harry L. Briggs	816.36
Chas. M. Childs & Co	748.69
Gould & Cutler	755.97
Class F:	
Globe Stationery and Printing Company	$720.26
Arthur & Bonnell	776.97
R. A. Robbins*	547.94
Class G:	
S. C. Forsaith Machine Company	939.73
Wetherill Bros	820.00
R. A. Robbins*	805.20
Class H:	
E. L. Maxwell	78.00

*Accepted. † Informal. ‡ Decided by lot.

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Proposals for furniture, engineering stores, etc., for the New York navy yard, etc.—Cont'd.

Class H—Continued.	
J. B. Morrell & Co*	$67.78
S. C. Forsaith Machine Company*.	105.50
Harry L. Briggs	88.38
R. A. Robbins	110.00
Class I:	
Harry L. Briggs*	156.10
R. A. Robbins	241.90
Class K:	
E. L. Maxwell*	22.35
S. C. Forsaith Machine Company	28.75
James W. Soper	25.00
R. A. Robbins	35.40
Class L:	
E. L. Maxwell*	157.89
J. B. Morrell & Co	211.23
Harry L. Briggs	204.44
Jas. W. Soper	199.41
R. A. Robbins	174.25
Class M:	
J. B. Morrell & Co.*	$23.15
Harry L. Briggs	236.35
R. A. Robbins	119.80
Class N:	
E. L. Maxwell*	843.54
R. A. Robbins	846.00
Class O:	
E. L. Maxwell	74.90
J. B. Morrell & Co.*	68.00
S. C. Forsaith Machine Company	80.00
R. A. Robbins	77.00
Class P:	
Harry L. Briggs*	52.45
R. A. Robbins	64.25
Class Q:	
Joseph Wechsler*	1,991.50
Liebmann Bros. & Orrings	2,155.25

Proposals for lumber, iron, and steel forgings, cruiser No. 8, Norfolk navy-yard, under Bureau advertisement dated September 22, 1890, opened October 7, 1890.

Class A:	
Geo. L. Neville	$676.02
Niemeyer & Co.*	648.00
A. A. McCullough	881.20
Class B:	
Geo. L. Neville*	1,746.80
J. W. Gaskill & Sons	1,829.48
A. A. McCullough	2,014.80
Class C:	
S. C. Forsaith Machine Company*.	438.75
Class D:†	
Geo. L. Neville	$3,152.00
Midvale Steel Co	2,560.00
Class E:	
Geo. L. Neville	399.90
Fairbanks & Co	500.00
Riehle Bros*	375.00
S. C. Forsaith Machine Company	478.00

Proposals for machine tools for the Boston navy-yard under Bureau advertisement dated September 19, 1890, opened October 7, 1890.

Class 1:	
S. C. Forsaith Machine Company	$4,950.00
The Niles Tool Works*	4,290.00
Bement, Miles & Co	4,900.00
E. L. Maxwell	4,450.00
Class 2:	
S. C. Forsaith Machine Company*.	462.50
The Niles Tool Works	870.00
Putnam Machine Company	660.00
Geo. Place	529.00
Harry L. Briggs	595.00
Fitchburg Machine Works	580.00
R. A. Robbins	947.00
Hill, Clarke & Co	500.00
Wm. Sellers & Co	1,060.00
E. L. Maxwell	740.00
Class 3:	
S. C. Forsaith Machine Company*.	339.25
R. A. Robbins	348.00
Class 4:†	
S. C. Forsaith Machine Company	34,600.00
Niles Tool Works	49,595.00
Bement, Miles & Co	43,750.00
Class 5:	
S. C. Forsaith Machine Company	1,457.50
Niles Tools Works	1,525.00
Bement, Miles & Co	2,950.00
William H. Warren	1,725.00
Fitchburg Machine Works*	925.00
Hill, Clarke & Co	1,500.00
Eugene L. Maxwell	1,500.00
Class 6:	
S. C. Forsaith Machine Company	273.93
E. L. Maxwell*	268.00
Class 7:	
S. C. Forsaith Machine Company	7,664.25
Niles Tool Works	7,932.00
Bement, Miles & Co	10,800.00
Morgan Engineering Company	7,905.00
William Sellers & Co	9,870.00
E. L. Maxwell*	6,540.00
Class 8:	
The S. C. Forsaith Machine Company	571.80
Donegan & Swift*	515.10
Harry L. Briggs	582.00
Jas. W. Soper	546.00
Class 8—Continued.	
Ansel W. Paine	$556.80
R. A. Robbins	552.00
Class 9:	
S. C. Forsaith Machine Company	780.00
Niles Tool Works*	749.00
Hill, Clarke & Co	750.00
Class 10:	
S. C. Forsaith Machine Company	1,167.50
Niles Tool Works	990.00
Bement, Miles & Co	1,075.00
Wm. Sellers & Co.*	835.00
Class 11:	
S. C. Forsaith Machine Company*.	892.50
Niles Tool Works	900.00
Bement, Miles & Co	1,650.00
Wm. H. Warren	1,425.00
Fitchburg Machine Works	1,275.00
Universal Radial Drill Company	740.00
Hill, Clarke & Co	820.00
Eugene L. Maxwell	760.00
Class 12:	
S. C. Forsaith Machine Company	470.62
Donegan & Swift	465.00
Harry L. Briggs	476.00
James W. Soper*	450.00
Ansel W. Paine	717.76
Hill, Clarke & Co	498.00
E. L. Maxwell	454.00
Class 13:	
S. C. Forsaith Machine Company	2,850.00
Niles Tool Works*	2,625.00
Bement, Miles & Co	2,800.00
E. L. Maxwell	2,600.00
Class 14:	
Fitchburg Machine Works	650.00
Hill, Clarke & Co.*	650.00
Class 15:	
S. C. Forsaith Machine Company	269.75
Donegan & Swift	380.00
Thos. H. Dallett & Co.*	265.75
Fitchburg Machine Works	325.00
Hill, Clarke & Co	300.00
E. L. Maxwell	280.00
Class 16:	
S. C. Forsaith Machine Company*.	1,490.00
Hill, Clarke & Co	1,518.00

* Accepted.

† Class not awarded.

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Proposals for machine tools for the Portsmouth navy-yard under Bureau advertisement dated September 20, 1890; opened October 7, 1890.

Class 1:	
Niles Tool Works*	$2,442.00
S. C. Forsaith Machine Co	2,974.00
Bement, Miles & Co	3,350.00
Eugene L. Maxwell	3,480.00
Class 2:	
Niles Tool Works	28,800.00
Bement Miles & Co	32,000.00
Bath Iron Works*	15,950.00
Class 3:	
William Sellers & Co	6,240.00
Niles Tool Works	6,500.00
S. C. Forsaith Machine Co	4,850.00
Bement Miles & Co	4,600.00
Eugene L. Maxwell*	4,200.00
Class 4:	
Putnam Machine Co	3,095.00
Fitchburg Machine Works	2,600.00
William Sellers & Co	3,635.00
Niles Tool Works	3,090.00
S. C. Forsaith Machine Co.*	2,345.00
Hill, Clarke & Co	2,700.00
George Place	2,740.00
Eugene L. Maxwell	3,070.00
Class 5:	
Morgan Engineering Co	7,905.00
William Sellers & Co	9,900.00
Niles Tool Works	7,932.00
S. C. Forsaith Machine Co	7,064.25
Bement, Miles & Co	10,800.00
Eugene L. Maxwell*	6,540.00
Class 6:	
The Putnam Machine Co.—	
Bid A	1,095.00
Bid B	1,475.00
Fitchburg Machine Works	1,165.00
Niles Tool Works	995.00
S. C. Forsaith Machine Co.*	946.00
Hill, Clarke & Co	1,031.00
Harry L. Briggs	1,258.00
George Place	1,038.00
Eugene L. Maxwell	1,082.00
Class 7:	
William Sellers & Co	1,910.00
Niles Tool Works*	1,655.00
S. C. Forsaith Machine Co	1,665.00
Class 7:	
Bement, Miles & Co	$2,575.00
Eugene L. Maxwell	1,850.00
Class 8:	
S. C. Forsaith Machine Co.*	333.75
Class 9:	
Fitchburg Machine Works	650.00
Hill, Clarke & Co.*	650.00
Class 10:	
Hill, Clarke & Co.*	430.00
Class 11:	
Donegan & Swift	180.00
S. C. Forsaith Machine Co	267.00
Hill, Clarke & Co.*	174.00
Ansel W. Paine	226.80
Harry L. Briggs	318.00
James W. Soper	246.96
Eugene L. Maxwell	288.00
Class 12:	
S. C. Forsaith Machine Co	1,000.00
Brown & Sharpe Manufacturing Company	1,091.00
Hill, Clarke & Co.*	845.00
Class 13:	
Donegan & Swift	306.60
S. C. Forsaith Machine Co	297.60
Ansel W. Paine	306.00
Harry L. Briggs	294.00
James W. Soper	312.00
Eugene L. Maxwell*	195.00
Class 14:	
Donegan & Swift	380.00
S. C. Forsaith Machine Co	269.75
Hill, Clarke & Co	300.00
Eugene L. Maxwell	280.00
Thos. H. Dallett & Co.*	265.75
Class 15:	
Niles Tool Works	375.00
Donegan & Swift	332.00
S. C. Forsaith Machine Co.*	313.00
Hill, Clarke & Co	325.00
Eugene L. Maxwell	330.00
Class 16:	
S. C. Forsaith Machine Co	273.93
Eugene L. Maxwell*	268.00

Proposals for lumber, washstands, etc., for the Naval Academy under Bureau advertisement dated Septembev 29, 1890; opened October 14, 1890.

Class B:	
Wm. D. Gill*	$361.15

Proposals for steam engineering stores for the New York navy-yard under Bureau advertisement dated Otctober 6, 1890; opened October 21, 1890.

Class A:	
J. B. Morrell & Co.*	$393.26
R. A. Robbins	440.90
Class B:	
Chas. H. Pleasants	205.91
Wm. McDonagh & Co	201.70
J. B. Morrell & Co	196.95
Gould & Cutler	200.75
Chas. M. Childs & Co.*	191.59
Class C:	
Jas. W. Soper	442.85
J. B. Morrell & Co	477.90
R. A. Robbins*	423.69
Class D:	
R. A. Robbins*	149.86
John F. Lovejoy & Co	169.10
Class E:	
Manning, Maxwell & Moore	1,121.18
R. A. Robbins*	1,097.20
Class F:	
R. A. Robbins	234.70
Harry L. Briggs*	170.55
Class G:	
Chas. H. Pleasants	67.50
J. B. Morrell & Co	86.00
R. A. Robbins	71.60
Harry L. Briggs*	57.85
Class H:	
J. B. Morrell & Co	374.40
R. A. Robbins*	362.06
Class I:	
Watson & Pittinger*	$275.00
Joseph W. Duryee	320.00
Lewis H. Ross	281.00
Class K:	
E. J. Temple	1,058.14
Jas. W. Soper	1,092.15
Manning, Maxwell & Moore*	972.84
R. A. Robbins	1,146.39
Class L:	
Manning, Maxwell & Moore*	32.20
J. B. Morrell & Co	40.50
R. A. Robbins	44.00
J. H. Sternbergh & Son	42.00
Class M:	
Chas. H. Pleasants*	45.50
Class N:	
E. J. Temple	289.39
R. A. Robbins*	208.76
John F. Lovejoy & Co	222.26
Class P:	
James W. Soper*	28.00
Manning, Maxwell & Moore	30.00
J. B. Morrell & Co	35.50
R. A. Robbins	86.50
Class Q:	
Jas. W. Soper*	192.00
R. A. Robbins	296.00

* Accepted.

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Proposals for lumber for naval training station, Newport, R. I., under Bureau advertisement dated October 1, 1890; opened October 21, 1890.

Class A:	
Ansel W. Paine*	$86.48
Class C:	
Ansel W. Paine*	$36.90

Proposals for lumber, machine bolts, etc., for the Norfolk navy-yard under Bureau advertisement dated October 2, 1890; opened October 21, 1890.

Class A:	
S. G. Winternetz	$2,837.73
Reuter & Mallory	3,181.20
George L. Neville*	2,465.00
Rowland A. Robbins	2,887.50
Morton, Reed & Co	2,812.70
S. C. Forsaith Machine Co	3,140.00
J. H. Sternbergh & Son	3,026.50
Class A—Continued.	
James W. Soper	$3,022.76
J. B. Morrell & Co	2,674.00
Class B:	
A. A. McCullough*	257.00
George L. Neville	286.75
Class C:	
George L. Neville*	140.00

Proposals for water pipe for the Portsmouth, N. H., navy-yard under Bureau advertisement dated September 30, 1890; opened October 21, 1890.

Class 53:	
S. C. Forsaith Machine Co.*	$1,989.62
Ansel W. Paine	3,491.25
Builders' Iron Foundry	2,206.00
R. A. Robbins	2,098.70
Rider & Cotton	2,054.25
Charles Miller & Son	2,047.10
Class 63:	
Johnson Foundry and Machine Co	688.80
Class 63—Continued.	
S. C. Forsaith Machine Co:	
Bid A*	$660.00
Bid B	768.00
Ansel W. Paine	1,080.00
Charles Miller & Son	936.00
Rider & Cotton	936.00

Proposals for chemical instruments, steel, etc., for the Washington Navy-yard under Bureau advertisement dated October 7, 1890; opened October 28, 1890.

Class A:	
Eimer & Amend*	$5,612.29
Class B:	
J. B. Kendall	722.28
S. C. Forsaith Machine Co*	668.11
Class C:	
Bridgeport Brass Company*	1,302.50
S. C. Forsaith Machine Co	1,437.50
Class D:	
J. B. Kendall*	990.00
Class E:	
Park Bro. & Co., limited	$368.90
R. A. Robbins	716.50
Carpenter Steel Co	892.50
Sanderson Bros. Steel Co.*	773.50
J. B. Kendall	714.00
Benjamin Atha & Co	847.85
Morton, Reed & Co	476.00

Proposals for machine tools, stores, etc., from the U. S. S. San Francisco, navy-yard Mare Island, Cal., under Bureau advertisement dated October 4, 1890; opened October 28, 1890.

Class A:	
Park & Lacy Co	$1,015.00
S. C. Forsaith Machine Co.:	
Bid A	1,090.05
Bid B*	1,010.05
Donegan & Swift	1,300.00
Dwight F. Walker	2,573.50
Class B:	
Dunham, Carrigan & Hayden Co.*	814.00
J. B. Morrell & Co	815.80
R. A. Robbins	1,005.60
Class C:	
Gutta-Percha Rubber Co	780.68
Mineralized Rubber Co.*	367.48
Dunham, Carrigan & Hayden Co	597.99
W. F. Bowers & Co	539.99
J. B. Morrell & Co	567.80
R. A. Robbins	797.70
Class D:	
Dunham, Carrigan & Hayden Co*	1,202.36
S. C. Forsaith Machine Co	1,358.96
J. B. Morrell & Co	1,212.62
James W. Soper	1,295.79
R. A. Robbins	1,349.95
Class E:	
Simon Thuebel	$145.50
Vacuum Oil Co	168.50
Taylor, Mason & Co	155.00
William P. Fuller, jr	154.50
Charles M. Yates*	142.50
Class F:	
Taylor, Mason & Co	840.61
J. B. Morrell & Co	991.60
William P. Fuller, jr	806.63
Charles M. Yates*	799.80
Charles H. Pleasants	904.33
Class G:	
Payot, Upham & Co*	135.30
Class H:	
William P. Fuller, jr*	138.00
Charles M. Yates	144.75
Charles H. Pleasants	149.45
Class K:	
Pacific Metal Works*	260.00
S. C. Forsaith Machine Co	295.00
R. A. Robbins	330.00

*Accepted.

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Proposals for boilers for the Ranger, at the Mare Island navy-yard, under Bureau advertisement dated October 3, 1890, opened October 28, 1890.

Class A:	
Carnegie, Phipps & Co.*	$2,300.80
Dunham, Carrigan & Hayden Company	3,163.60
Class B:	
J. B. Morrell & Co.*	294.00
Dunham, Corrigan & Hayden Company	441.00
R. A. Robbins	310.80
Class C:	
Dunham, Carrigan & Hayden Company*	217.44
Class D:	
Dunham, Carrigan & Hayden Company*	$219.80
Class E:	
J. B. Morrell & Co.	2,016.00
Carolan & Co.*	792.96
S. C. Forsaith Machine Company	1,196.16
Dunham, Carrigan & Hayden Company	1,344.00

Proposals for provisions, clothing, and small stores for the New York navy-yard under Bureau advertisement dated October 23, 1890, opened November 11, 1890.

5,000 yards cloth for coats, jackets, and caps (per yard):	
Francis H. Smith	$2.13
B. Y. Pippey & Co.	2.07
Sullivan, Vail & Co.*	1.90⅜
Wendell, Fay & Co.	1.93 44/100
15,000 yards cloth for trousers (per yard):	
Francis H. Smith	2.45
Henry T. Kent*	2.24
B. Y. Pippey & Co.	2.36
Sullivan, Vail & Co.	2.29½
Wendell, Fay & Co.	2.35 49/100
2,000 blankets (each):	
T. A. Ashburner*	2.43¾
Tissot & Schultz	2.75
Henry T. Kent	4.86
B. Y. Pippey & Co.	2.44
Joseph Wechsler	2.53
5,000 watch caps (each):	
Horstmann Brothers	.47 79/100
B. Y. Pippey & Co.	.47
Joseph Wechsler	.47 95/100
Stanley J. Benner*	.46 85/100
20,000 pounds salt beef, in barrels (per pound):	
J. B. Morrell & Co.	.05½
Francis H. Leggett & Co.*	.05 37/100
Charles F. Mattlage	.05 54/100
Armour & Co.	.05½
30,000 pounds tinned beef (per pound):	
Francis H. Leggett & Co.	.06 87/100
Thurber, Whyland & Co.	.08 10/100
Charles F. Mattlage*	.06¼
Armour & Co.	.07½
32,000 pounds tinned corned beef (per pound):	
Thurber, Whyland & Co.	.00 64/100
Charles F. Mattlage*	.07 20/100
33,000 pounds ham (per pound):	
Thurber, Whyland & Co.	.13 94/100
Charles F. Mattlage*	.13½
Armour & Co.	.14½
15,000 pounds sausage (per pound):	
Kemp, Day & Co.	.12
F. H. Leggett & Co.*	.09 28/100
Thurber, Whyland & Co.	.11 44/100
Charles F. Mattlage	.10 4/10
Armour & Co.	.09½
2,000 pounds cocoa (per pound):	
Kemp, Day & Co.*	.31 2/10
Thurber, Whyland & Co.	.35 80/100
50,000 pounds sugar, in half barrels (per pound):	
Francis H. Leggett & Co.*	.06¼
Thurber, Whyland & Co.	.06 25/100
F. Behre & Bro.	.06 100/100
1,000 gallons syrup (per gallon):	
Francis H. Leggett & Co.*	.27 27/100
Thurber, Whyland & Co.	.42
F. Behre & Bro.	.37
30,000 pounds tinned vegetables (per pound):	
Kemp, Day & Co.	.06 2/10
Francis H. Leggett & Co.*	.06 17/100
30,000 pounds tinned vegetables (per pound)—Continued.	
Thurber, Whyland & Co.	$0.07½
3,000 jack-knives (each):	
R. A. Robbins*	.44
2,000 blacking brushes (each):	
Harry L. Briggs	.21½
John Early	.21 85/100
J. B. Morrell & Co.	.28
William H. Miles	.29
Joseph Wechsler	.22½
R. A. Robbins*	.20 7/10
Vallentine Stortz	.23
Marc M. Michael	.24
2,000 whisk brooms (each):	
Harry L. Briggs	.13 6/10
John Early	.13 42/100
J. B. Morrell & Co.	.17½
H. T. Wakeman	.18½
Joseph Wechsler	.15
R. A. Robbins	.16 7/10
2,500 boxes blacking (each):	
Harry L. Briggs*	.02 2/10
R. A. Robbins	.03
Marc M. Michael	.03 48/100
1,000 dozen rubber buttons, small (per dozen):	
Tissot & Schultz	.04 32/100
Joseph Wechsler	.06
R. A. Robbins	.04 3/10
Marc M. Michael*	.04
3,000 pieces white linen tape (per piece):	
Tissot & Schultz	.01 68/100
Horstmann Brothers	.01⅛
Joseph Wechsler*	.01⅛
Marc M. Michael	.01 64/100
5,000 spools sewing silk (per spool):	
Tissot & Schultz	.03 48/100
Marc M. Michael*	.02 80/100
5,000 papers needles (per paper):	
Harry L. Briggs	.02 31/100
Joseph Wechsler*	.02
Marc M. Michael	.02 4/10
720 scrub brushes (each):	
Harry L. Briggs	.15 6/10
John Early	.17 40/100
J. B. Morrell & Co*	.15½
William H. Miles	.33
Joseph Wechsler	.17
R. A. Robbins	.16 7/10
Vallentine Stortz.	.16½
Marc M. Michael	.22
3,000 agate cups (each):	
Tissot & Schultz	.37 33/100
Charles H. Pleasants	.41 66/100
Harry L. Briggs	.42½
John Early	.42 33/100
J. B. Morrell & Co.	.39 6/10
H. T. Wakeman	.44
Joseph Wechsler	.41
Rowland A. Robbins*	.36 73/100
Marc M. Michael	.45
3,000 agate bowls (each):	
Tissot & Schultz*	.28 34/100

*Accepted

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***Proposals for provisions, clothing, and small stores for the New York navy-yard, etc.*—Continued.**

3,000 agate bowls (each)—Continued.	
Charles H. Pleasants	$0.29 88/100
Harry L. Briggs	.30 90/100
John Early	.30 95/100
J. B. Morrell & Co	.28 1/2
H. T. Wakeman	.32
Joseph Wechsler	.29 1/2
R. A. Robbins	.28 3/10
Marc M. Michael	.33
3,000 agate plates (each):	
Tissot & Schultz	.28 3/4 100
Chas. H. Pleasants	.28 100/100
3,000 agate plates (each)—Continued.	
Harry L. Briggs	$0.29 1/4
John Early	.29 1/4
J. B. Morrell & Co.*	.28
H. T. Wakeman	.31
Joseph Wechsler	.29 3/4
R. A. Robbins	.28 1/2
Marc M. Michael	.32
6 letter scales (each):	
Harry L. Briggs	4.75
Marc M. Michael*	4.00

Proposals for coal for the navy-yard, Mare Island, and for Honolulu, H. I., under Bureau advertisement dated October 15, 1890; opened November 11, 1890.

Class 20 A:	
Bloomington Mining Company	$23,385.00
Henry Rosenfeld*	21,435.00
David Duncan & Son	26,535.00
Sam'l G. French	22,410.00
Class 20 B:	
Bloomington Mining Co	15.840.00
Class 20 B—Continued:	
Henry Rosenfeld	$16,140.00
David Duncan & Son	17,450.00
Edward B. Townsend	17,720.00
Sam'l G. French*	15,440.00

Proposals for timber-bending machine for the Portsmouth navy-yard, under Bureau advertisement dated October 29, 1890; opened November 11, 1890.

Class 38:	
Augustus Stevenson*	$2,500.00

Proposals for lamps, etc., for the naval training station, Newport, R. I., under Bureau advertisement dated October 23, 1890; opened November 11, 1890.

Class A:	
Tissot & Schultz*	$115.75
Ansel W. Paine	$234.75
R. A. Robbins	124.50

Proposals for machine tools for the Mare Island navy-yard, under Bureau advertisement dated October 21, 1890; opened November 18, 1890.

Class 1:	
Niles Tool Works*	$19,650.00
Class 2:	
Niles Tool Works*	3,240.00
Class 3:	
Niles Tool Works	595.00
Park & Lacy Co.*	565.00
H. B. Gregory	700.00
S. C. Forsaith Machine Co	671.50
R. A. Robbins	797.00
Class 4:	
Park & Lacy Co.†	750.00
S. C. Forsaith Machine Co	776.00
R. A. Robbins*	773.00
Class 6:	
Niles Tool Works	1,657.00
Manning, Maxwell & Moore*	1,577.00
S. C. Forsaith Machine Co	1,600.00
Class 7:	
Jas. W. Soper	1,302.90
Manning, Maxwell & Moore	1,039.90
S. C. Forsaith Machine Company	1,015.87
Dunham, Carrigan & Hayden Co.*	876.00
Class 8:	
Jas. W. Soper	384.50
Manning, Maxwell & Moore*	384.35
S. C. Forsaith Machine Co.†	377.30
Dunham, Carrigan & Hayden Co	399.00
R. A. Robbins	418.65
Class 9:	
Pacific Tool and Supply Co.*	190.04
S. C. Forsaith Machine Co	438.80
Class 10:	
Manning, Maxwell & Moore*	1,163.49
Pacific Tool and Supply Co	1,190.40
S. C. Forsaith Machine Co	1,215.94
Dunham, Carrigan & Hayden Co	1,407.85
R. A. Robbins	1,832.20
Class 11:	
H. B. Gregory*	$130.00
S. C. Forsaith Machine Co.†	126.75
Class 12:	
Niles Tool Works*	239.50
Class 14:	
Jas. W. Soper	480.18
Manning, Maxwell & Moore	386.40
H. B. Gregory	478.18
S. C. Forsaith Machine Co	388.25
R. A. Robbins*	351.05
Class 15:	
Augustus Stevenson*	3,000.00
Class 16:	
Niles Tool Works*	1,127.00
Park & Lacy Company	1,129.00
James W. Soper	3,030.00
Manning, Maxwell & Moore	1,520.00
H. B. Gregory	2,224.00
S. C. Forsaith Machine Co	1,168.00
Putnam Machine Company { bid A	1,235.00
Putnam Machine Company { bid B	1,470.00
Dunham, Carrigan & Hayden Co	1,622.50
R. A. Robbins	2,041.00
Fitchburg Machine Co	1,465.00
Class 17:	
Niles Tool Works { bid A	1,247.00
Niles Tool Works { bid B*	1,021.00
D. F. Walker	1,190.00
James W. Soper	1,548.00
S. C. Forsaith Machine Co	1,221.00
R. A. Robbins	1,447.00
Browne & Sharpe Manufacturing Company	1,245.00
Class 19:	
Niles Tool Works	598.00
Park & Lacy Co. { bid A	520.00
Park & Lacy Co. { bid B	675.00

* Accepted.

† Informal.

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Proposals for machine tools for the Mare Island navy-yard, etc.—Continued.

Class 19—Continued.	
Manning, Maxwell & Moore	$525.00
H. B. Gregory	875.00
S. C. Forsaith Machine Co.:	
Bid A	669.50
Bid B	519.50
Dunham, Carrigan & Hayden Co.*	497.50
Class 20:	
Dunham, Carrigan & Hayden	5,329.00
R. A. Robbins*	4,181.50
Hinckley, Spears & Hayes	4,234.50
Class 21:	
Niles Tool Works	253.00
D. F. Walker	239.00
Park & Lacy Co.*	185.00
Manning, Maxwell & Moore	220.00
H. B. Gregory	300.00
S. C. Forsaith Machine Co:†	
Bid A	203.00
Bid B	178.20
Class 22:	
Niles Tool Works	57.00
Park & Lacy Co.*	25.00
James W. Soper	55.00
H. B. Gregory	70.00
S. C. Forsaith Machine Co	53.67
Class 24:	
Park & Lacy Co.*	218.00
James W. Soper	312.00
Tatum & Bowen	275.00
H. B. Gregory	295.00
S. C. Forsaith Machine Co	245.00
Class 25:	
Niles Tool Works	509.00
D. F. Walker	493.00
Park & Lacy Co.*	425.00
H. B. Gregory	550.00
S. C. Forsaith Machine Co.:	
Bid A	548.50
Bid B	466.00
Class 26:	
Niles Tool Works*	189.00
D. F. Walker	225.00
Tatum & Bowen	225.00
H. B. Gregory	235.00
S. C. Forsaith Machine Co	277.00
Class 27:	
Niles Tool Works*	$143.00
Park & Lacy Co.*	147.00
James W. Soper	218.70
Manning, Maxwell & Moore	148.00
H. B. Gregory	160.00
S. C. Forsaith Machine Co	161.00
Class 30:	
D. F. Walker	53.00
Park & Lacy Co.*	45.00
Tatum & Bowen	50.00
Manning, Maxwell & Moore	100.00
H. B. Gregory	116.00
S. C. Forsaith Machine Co.†	39.00
Class 31:	
D. F. Walker*	112.00
James W. Soper	201.00
Manning, Maxwell & Moore	140.00
S. C. Forsaith Machine Co	161.51
Brown & Sharpe Mfg. Co	126.00
Class 32:	
Niles Tool Works	210.00
D. F. Walker	250.00
Park & Lacy Co.*	150.00
Tatum & Bowen	180.00
H. B. Gregory	300.00
S. C. Forsaith Machine Co	281.50
Class 33:	
Niles Tool Works	149.00
D. F. Walker	184.00
Park & Lacy Co.*	85.00
Tatum & Bowen	140.00
Manning, Maxwell & Moore	169.00
S. C. Forsaith Machine Co	137.00
Class 34:	
James W. Soper	237.79
Pacific Tool and Supply Co	130.02
Dunham, Carrigan & Hayden Co	191.84
R. A. Robbins	198.07
Osborne & Alexander	290.45
Class 35:	
S. C. Forsaith Machine Co.†	760.00
R. A. Robbins*	773.00
Class 36:	
Manning, Maxwell & Moore*	560.00
S. C. Forsaith Machine Co.†	467.27

Proposals for ordnance stores for the Washington navy-yard, under Bureau advertisement dated October 25, 1890, opened November 18, 1890.

Class 6:	
McFadden & Co	$117.04
R. A. Robbins*	110.20
J. B. Kendall	115.75
Billany & Cochrane	122.30
Class 7:	
R. A. Robbins	1,455.00
J. B. Kendall*	1,092.50
John F. Lovejoy & Co	1,722.50
Class 14:	
McFadden & Co	30.66
Harry L. Briggs	30.80
S. C. Forsaith Machine Co	31.50
R. A. Robbins	30.16
J. B. Kendall	33.00
James W. Soper*	28.64
John F. Lovejoy & Co	45.20
Charles H. Pleasants	40.16
Class 18:	
Harry L. Briggs	64.00
R. A. Robbins	67.50
J. B. Kendall*	61.00
John F. Lovejoy & Co	85.00
Class 20:	
S. C. Forsaith Machine Co.*	36.20
Class 21:	
S. C. Forsaith Machine Co.†	
Bid A	6,901.00
Bid B	6,726.00
R. A. Robbins	7,037.00
J. B. Kendall*	6,758.00
James W. Soper	7,122.50
Class 21—Continued.	
John F. Lovejoy	$7,690.00
Class 24:	
Simon Thuebel	523.58
Charles H. Pleasants*	458.86
Charles M. Childs & Co	494.55
Class 25:	
Charles Miller & Son*	1,495.38
Harry L. Briggs	1,572.91
S. C. Forsaith Machine Co	1,690.75
J. B. Kendall	1,649.00
Class 27:	
R. A. Robbins	79.20
J. B. Kendall*	63.60
Charles H. Pleasants	106.50
Class 31:	
McFadden & Co	2,270.14
Charles Miller & Son	2,217.75
Harry L. Briggs*	2,103.19
James B. Lambie	2,148.42
R. A. Robbins	2,146.88
Morton, Reed & Co	2,133.79
J. B. Kendall	2,160.02
James W. Soper	2,216.16
Ansel W. Paine	2,466.28
Tissot & Schultz	2,239.73
Francis T. Witte Hardware Co	2,135.51
Billany & Cochrane	2,360.62
Class 32:	
J. B. Kendall*	208.50
Charles H. Pleasants	297.75

* Accepted.

† Informal.

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Proposals for constructors' stores for the New York navy-yard, under Bureau advertisement dated October 23, 1890; opened November 18, 1890.

Class A:	
R. A. Robbins	$347.64
J. B. Morrell & Co	307.32
Harry L. Briggs*	298.40
Jas. W. Soper	430.60
Class B:	
A. Schrader & Son*	1,141.00
Ansel W. Paine	1,456.00
Andrew J. Morse	1,429.00
Class C:	
Chas. H. Pleasants	268.69
R. A. Robbins	223.00
J. B. Morrell & Co	209.19
Harry L. Briggs*	92.10
Class D:	
Chas. H. Pleasants	$539.11
Gould & Cutler	585.20
Tissot & Shultz	558.29
Simon Thuebel	548.80
J. B. Morrell & Co.*	530.43
Harry L. Briggs	609.66
Wm. McDonagh & Co	535.94
Chas. M. Childs & Co	536.93
Class E:	
Chas. H. Pleasants*	102.15
Class F:	
S. C. Forsaith Machine Co.*	394.00

Proposals for equipment stores for the Boston navy-yard, under Bureau advertisement dated October 27, 1890; opened November 18, 1890.

Class A:	
S. C. Forsaith Machine Co	$4,281.65
R. A. Robbins*	3,799.50
John F. Lovejoy & Co	4,801.00
Class B:	
Bolles & Wilde	213.70
R. A. Robbins	116.85
Chas. H. Pleasants*	96.10
Ansel W. Paine	141.50
J. B. Morrell & Co	119.90
John F. Lovejoy & Co	259.95
Class C:	
Taylor P. Thompson	135.00
R. A. Robbins	129.00
Fiske, Coleman & Co.*	123.00
Ansel W. Paine	198.00
John F. Lovejoy & Co	168.00
Class D:	
M. Boynton & Co	1,902.05
R. A. Robbins	1,958.25
Wm. D. Clarke†	1,881.50
J. B. Morrell & Co.*	1,889.13
John F. Lovejoy & Co	2,128.00
Class E:	
Bolles & Wilde	$55.00
R. A. Robbins	67.09
Ansel W. Paine	100.00
J. B. Morrell & Co.*	50.00
John F. Lovejoy & Co	70.00
Class F:	
J. O. Wetherbee*	111.60
Class G:	
Bolles & Wilde*	67.50
Ansel W. Paine	75.00
Class H:	
Bolles & Wilde	242.25
Taylor P. Thompson	185.50
Chas. H. Pleasants*	183.75
Gould & Cutler	189.80
Class I:	
Bolles & Wilde	27.00
Taylor P. Thompson	26.00
Chas. H. Pleasants	25.16
J. B. Morrell & Co	25.80
Gould & Cutler*	23.65

Proposals for steam capstan, windlass, constructors' stores, etc., for the Norfolk navy-yard, under Bureau advertisement dated October 24, 1890, opened November 18, 1890.

Class C:	
Geo. L. Neville*	$37.10
Class D:	
Geo. L. Neville*	80.53
Class E:	
Geo. L. Neville*	40.00
Class F:	
Harry L. Briggs	1,119.90
Class F—Continued.	
Chas. M. Childs & Co*	$962.33
Geo. L. Neville	1,119.50
Class H:	
R. A. Robbins*	59.64
Class I:	
American Ship Windlass Co.*	7,050.00

Proposals for building material for the Mare Island navy-yard, under Bureau advertisement dated October 17, 1890, opened November 18, 1890.

Class A:	
H. T. Holmes Lime Company	$2,300.68
Wm. Walker	2,157.00
A. Powell	2,039.09
A. S. Carman*	1,860.67
Class B:	
Dunham, Carrigan and Hayden Co.*	80.40
Class C:	
Wm. Walker	1,373.82
A. Powell	1,432.13
Class C—Continued.	
J. F. Kennedy	$1,475.95
A. S. Carman*	1,342.14
Class D:	
S. C. Forsaith Machine Co	539.86
Dunham, Carrigan and Hayden Co.*	464.70
Class E:	
Chas. H. Pleasants	90.00
Dunham, Carrigan and Hayden Co.*	79.13

* Accepted.

† Refused to execute contract.

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Proposals for steel material for the U. S. monitor Monadnock, navy-yard, Mare Island, under Bureau advertisement dated October 20, 1890, opened November 18, 1890.

Class A, 1:	
Carnegie, Phipps & Co.,* per pound.	0.05¾
Class A:	
Carnegie, Phipps & Co.,* per pound.	0.05¾
Class D:	
Carnegie, Phipps & Co.,* per pound.	0.05¾
Class E:	
J. H. Sternbergh & Son	$2,141.00
S. C. Forsaith Machine Co.*	2,022.05
J. B. Morrell & Co	2,616.76

Proposals for material for cruiser No. 8, at the Norfolk navy-yard, under Bureau advertisement dated November 18, 1890, opened December 2, 1890.

Class 10:	
Jas. W. Soper	$670.51
J. B. Morrell & Co	629.74
J. H. Sternbergh & Son*	521.73
Harry L. Briggs	651.70
R. A. Robbins	746.97
Geo. L. Neville	817.89
Donegan & Swift	776.51
Charles H. Pleasants	590.28
Class 11:	
E. H. Shannon	168.13
White & Dodson	99.03
Gould & Cutler*	95.38
Clarendon Oil Co	176.31
Geo. L. Neville	103.85
Class 19:	
J. B. Morrell & Co.*	17.00
White & Dodson	41.10
Geo. L. Neville	33.00
Class 21:	
E. H. Shannon	697.68
White & Dodson	701.10
Geo. L. Neville*	693.50
Class 25:	
E. H. Shannon*	1,051.97
H. L. Briggs	1,080.67
White & Dodson	1,222.73
Ansel W. Paine	1,191.20
Geo. L. Neville	1,189.59
Class 32:	
J. B. Morrell & Co	178.00
Harry L. Briggs	133.00
R. A. Robbins	126.00
White & Dodson*	125.00
Geo. L. Neville	139.50
Charles H. Pleasants	129.16
Class 33:	
William S. Cross	2,599.50
William G. Hitchcock	2,230.50
Geo. L. Neville*	2,055.00
J. W. Gaskill & Sons	2,671.50
Jos. W. Duryee	2,446.00
Class 24:	
George L. Neville*	657.20
Class 35:	
Willis G. Hitchcock	5,964.00
Geo. L. Neville	6,012.00
J. W. Gaskill's Sons*	5,761.00
Jos. W. Duryee	5,974.00
Class 36 A:	
Geo. L. Neville*	3,498.25
J. W. Gaskill's Sons	5,159.00
Jos. W. Duryee	4,790.50
Class 36 B:	
Geo. L. Neville*	107.50
Class 37 A:	
Wm. S. Cross	2,232.00
Willis G. Hitchcock	2,010.00
Geo. L. Neville	2,350.00
J. W. Gaskill's Sons*	1,859.00
Jos. W. Duryee	2,300.00
Class 38:	
James W. Soper	1,333.50
J. B. Morrell & Co	1,365.95
S. C. Forsaith Machine Co	1,350.38
Harry L. Briggs	1,347.80
R. A. Robbins*	1,304.50
White & Dodson	1,370.00
Class 38—Continued.	
Geo. L. Neville	$1,329.08
Donegan & Swift	1,344.00
Chas. H. Pleasants	1,387.89
Colwell Lead Co	1,351.70
Class 39:	
E. H. Shannon	919.59
S. C. Forsaith Machine Co	945.29
Harry L. Briggs	861.06
R. A. Robbins	880.77
White & Dodson	929.06
Geo. L. Neville	855.82
Donegan & Swift	869.10
Chas. H. Pleasants*	836.62
Chas. Miller & Son	918.79
Colwell Lead Co	845.31
Class 40:	
E. H. Shannon	58.95
R. A. Robbins	59.00
White & Dodson	65.00
Geo. L. Neville	52.82
Chas. H. Pleasants*	48.66
Class 41:	
E. H. Shannon	317.00
James W. Soper	312.00
J. B. Morrell & Co	300.00
S. C. Forsaith, Machine Co	339.00
R. A. Robbins	311.00
White & Dodson	306.00
Geo. L. Neville*	298.50
Donegan & Swift	360.00
Chas. H. Pleasants	407.50
Chas. Miller & Son	321.00
E. J. Temple	315.00
Class 43:	
White & Dodson	90.50
George L. Neville	111.50
Charles H. Pleasants*	37.63
Class 47:	
E. H. Shannon	65.02
Harry L. Briggs	67.48
R. A. Robbins	68.65
White & Dodson*	64.75
George L. Neville	65.09
Charles H. Pleasants	76.11
Class 48:	
White & Dodson	229.00
George L. Neville	220.00
Charles H. Pleasants*	212.00
Class 50:	
Vacuum Oil Company	129.00
White & Dodson	137.50
Clarendon Oil Company*	104.50
Geo. L. Neville	131.00
Stevenson Bro. & Co	137.00
Class 52 A:	
E. H. Shannon	1,446.00
J. B. Morrell & Co	1,535.50
Harry L. Briggs	1,476.50
Charles M. Childs & Co*	1,270.60
White & Dodson	1,341.40
Gould & Cutler	1,354.60
Clarendon Oil Co	1,490.45
George L. Neville	1,431.10
Charles H. Pleasants	1,315.68
Class 52 B:	
E. H. Shannon	76.80
Charles H. Pleasants*	71.40

* Accepted.

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Proposals for material for cruiser No. 8, at the Norfolk navy-yard, etc.—Continued.

Class 53:	
S. C. Forsaith Machine Co	$1,187.75
H. L. Briggs	1,247.38
R. A. Robbins	1,128.38
George L. Neville	1,232.14
Donegan & Swift*	1,068.52
Class 56:	
R. A. Robbins	54.72
White & Dodson*	25.70
George L. Neville	40.25
Charles H. Pleasants	62.63
Class 58:	
E. H. Shannon	184.73
Harry L. Briggs*	173.06
R. A. Robbins	216.76
Geo. L. Neville	181.21
Class 59 A:	
E. H. Shannon	130.00
James W. Soper	128.00
R. A. Robbins	140.00
White & Dodson	128.70
Geo. L. Neville*	120.00
Chas. H. Pleasants	129.90
Class 59 B:	
J. B. Morrell & Co	176.40
Harry L. Briggs*	128.90
Class 59 B—Continued.	
R. A. Robbins	$251.80
White & Dodson	182.55
Geo. L. Neville	166.56
Donegan & Swift	189.75
Class 63:	
White & Dodson	914.95
Geo. L. Neville	880.30
Donegan & Swift	819.95
Chas. Millar & Son*	726.25
Class 69:	
E. H. Shannon*	74.50
J. B. Morrell & Co	81.00
S. C. Forsaith Machine Co	77.75
Harry L. Briggs	78.00
R. A. Robbins	82.00
White & Dodson	81.50
Geo. L. Neville	77.50
Donegan & Swift	84.50
Chas. H. Pleasants	91.00
Class 71:	
J. B. Morrell & Co*	117.00
R. A. Robbins	250.00
White & Dodson	195.00
Geo. L. Neville	137.00
Chas. H. Pleasants	137.50

Proposals for material for the Amphitrite at the Norfolk navy-yard, under Bureau advertisement dated November 19, 1890, opened December 2, 1890.

Class 10:	
H. L. Briggs*	$21.32
James W. Soper	30.84
R. A. Robbins	24.70
Chas. H. Pleasants	28.27
White & Dodson	28.95
Geo. L. Neville	29.54
J. B. Morrell & Co	22.70
Class 25:	
E. H. Shannon*	847.69
Harry L. Briggs	900.18
Ansel W. Paine	984.48
White & Dodson	996.38
Geo. L. Neville	1,008.60
Class 36:	
Geo. L. Neville*	87.50
Class 38 A:	
Williamson Bros*	3,475.00
Class 38 B:	
H. L. Briggs	54.70
Jas. W. Soper*	53.60
R. A. Robbins	55.73
Chas. H. Pleasants	54.68
Colwell Lead Co	55.60
S. C. Forsaith Machine Co	61.94
White & Dodson	53.93
Geo. L. Neville	56.63
J. B. Morrell & Co	62.85
Class 39:	
Harry L. Briggs	266.34
Chas. Miller & Son	233.23
R. A. Robbins	250.93
Chas. H. Pleasants	233.68
Colwell Lead Co*	227.88
S. C. Forsaith Machine Co	261.10
White & Dodson	240.16
Geo. L. Neville	230.90
Class 40:	
R. A. Robbins	20.50
Chas. H. Pleasants	17.56
White & Dodson	21.00
Geo. L. Neville*	16.02
Class 41:	
E. J. Temple	320.00
Chas. Miller & Son	332.50
Jas. W. Soper	307.00
R. A. Robbins	305.50
S. C. Forsaith Machine Co	358.50
White & Dodson*	305.00
Geo. L. Neville	322.50
J. B. Morrell & Co	325.00
Class 47:	
Harry L. Briggs	$42.25
R. A. Robbins	45.00
White & Dodson*	39.25
Geo. L. Neville	39.87
J. B. Morrell & Co	42.32
Class 48:	
Charles H. Pleasants*	424.00
White & Dodson	458.00
George L. Neville	440.00
Class 52:	
Harry L. Briggs	631.50
Charles M. Childs & Co	551.10
Clarendon Oil Company	632.88
Charles H. Pleasants*	545.63
White & Dodson	580.50
Gould & Cutler	573.60
George L. Neville	619.25
J. B. Morrell & Co	591.50
Class 53:	
Harry L. Briggs	597.43
Charles Millar & Son	583.73
R. A. Robbins	607.65
Charles H. Pleasants	608.17
Colwell, Lead Co.*	565.15
S. C. Forsaith Machine Company	578.57
George L. Neville	578.83
Class 58:	
H. L. Briggs*	64.68
George L. Neville	67.80
J. B. Morrell & Co	99.15
Class 59 A:	
James W. Soper	102.40
R. A. Robbins	112.00
Charles H. Pleasants	103.92
White & Dodson	105.60
George L. Neville*	96.00
Class 59 B:	
H. L. Briggs	68.10
James W. Soper	70.40
R. A. Robbins	71.50
White & Dodson	71.35
George S. Neville	65.36
J. B. Morrell & Co.*	63.40
Class 59 C:	
James W. Soper	275.00
R. A. Robbins	300.00
Charles H. Pleasants	311.25
George L. Neville	356.25
J. B. Morrell & Co.*	250.00

*Accepted.

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Proposals for material for the Amphitrite at the Norfolk navy-yard, etc.—Continued.

Class 63:	
Charles Millar & Son*	$502.20
White & Dodson	619.00
George L. Neville	644.65
Class 68:	
H. L. Briggs	41.77
R. A. Robbins	52.50
White & Dodson*	27.39
George L. Neville	42.21
J. B. Morrell & Co	45.35
Class 69:	
Harry L. Briggs*	57.00
Class 69—Continued.	
R. A. Robbins	$61.50
S. C. Forsaith Machine Company	59.37
White & Dodson	59.00
George L. Neville	58.75
J. B. Morrell & Co	58.50
Class 71:	
R. A. Robbins	113.00
Charles H. Pleasants	37.30
White & Dodson	84.80
George L. Neville	43.00
J. B. Morrell & Co.*	34.20

Proposals for engineering stores and salt pork for the New York Navy-yard, under Bureau advertisement dated November 17, 1890, opened December 2, 1890.

Class 54:	
J. B. Morrell & Co	$4,704.00
John W. Innerarity†	4,350.00
Chas. F. Mattlage	4,542.00
Francis H. Leggett & Co.*	4,494.00
J. O. Armour	5,400.00
Class 5:	
J. B. Morrell & Co.*	37.25
Chas. H. Pleasants	52.37
James W. Soper	41.87
R. A. Robbins	39.25
Class 7:	
R. A. Robbins	184.40
H. L. Briggs*	131.00
Class 14:	
J. B. Morrell & Co	295.12
Ansel W. Paine	361.85
Harry L. Briggs*	267.76
Class 19:	
Watson & Pittinger	79.00
Lewis H. Ross*	78.00
Jos. W. Duryee	120.00
Class 21:	
J. B. Morrell & Co	1,578.43
Jas. W. Soper	1,571.28
R. A. Robbins*	1,506.73
Class 20:	
R. A. Robbins*	22.50
Class 23:	
J. B. Morrell & Co	$80.00
R. A. Robbins*	67.00
Class 24 A:	
J. B. Morrell & Co	84.55
Gould & Cutler	83.75
Chas. H. Pleasants	79.75
Wm. McDonagh & Co.*	70.35
Chas. M. Childs & Co	74.80
Class 24 B:	
Chas. A. Pleasants*	34.65
Class 24 C:	
J. B. Morrell & Co	196.00
Chas. H. Pleasants	225.00
R. A. Robbins	212.00
Manhattan Oil Company*	192.12
T. J. Gilroy & Co	197.00
Class 31:	
J. B. Morrell & Co	318.90
James W. Soper*	302.04
R. A. Robbins	339.50
Class 32:	
J. B. Morrell & Co	100.00
Chas. H. Pleasants*	63.40
R. A. Robbins	85.75
H. L. Briggs	74.30

Proposals for machine tools, stores for the Newark, etc., for the New York Navy-yard, under Bureau advertisement dated November 17, 1890, opened December 2, 1890.

Class A:	
Donegan & Swift*	$1,144.15
S. C. Forsaith Machine Company†	796.64
Class B:	
James W. Soper	783.31
R. A. Robbins	751.83
J. B. Morrell & Co.*	696.59
Class C:	
Donegan & Swift	825.55
James W. Soper	672.83
R. A. Robbins	977.17
J. B. Morrell & Co.*	648.35
Class D:	
Donegan & Swift	653.60
R. A. Robbins	650.83
J. B. Morrell & Co.*	619.95
Class E:	
Manhattan Oil Company	$895.50
Vacuum Oil Company*	775.00
T. J. Gilroy & Co	915.00
Class F:	
R. A. Robbins*	20.71
J. B. Morrell & Co	50.37
Class G:	
Chas. H. Pleasants	1,026.88
R. A. Robbins	1,057.00
Clarendon Oil Company	1,005.02
Chas. M. Childs & Co	948.82
Wm. McDonagh & Co	983.75
J. B. Morrell & Co.*	937.95
Class H:	
R. A. Robbins*	68.85

Proposals for lumber for the Naval Academy, Annapolis, Md., under Bureau advertisement dated November 15, 1890, opened December 2, 1890.

Class A:	
Chas. H. Pleasants*	$58.90
J. C. Forsaith Machine Company	60.00
Class B:	
Joseph W. Duryee*	$1,011.70
Wm. D. Gill	1,200.80

* Accepted. † Informal.

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Proposals for lumber, etc., for the Naval Station, New London, Conn., under Bureau advertisement dated November 14, 1890, opened December 2, 1890.

Class A:	
Nathan S. Gallup*	$3,683.00
Joseph W. Duryee	5,275.00
Class B:	
S. C. Forsaith Machine Company	126.00
Chas. H. Pleasants	116.40
Class B—Continued.	
Nathan S. Gallup	$108.00
Ansel W. Paine	135.00
Chas. F. Chaney	108.00
J. B. Morrell & Co *	106.50

Proposals for engineering stores for the Mare Island Navy-yard, under Bureau advertisement dated November 13, 1890, opened December 9, 1890.

Class A:	
Chas. H. Pleasants	$69.00
J. B. Morrell & Co.*	50.00
Dunham, Carrigan & Hayden Company	51.00
Class B:	
Hawley Brothers Hardware Company	102.00
Dunham, Carrigan & Hayden Company	110.00
Albert Gallatin	84.00
W. F. Bowers & Co.*	83.00
Class C:	
Wm. Walker*	190.00
A. S. Carman	196.00
J. F. Kennedy	210.00
Class D:	
Hawley Brothers Hardware Company *†	44.00
Dunham, Carrigan & Hayden Company	44.00
Class E:	
Chas. H. Pleasants	265.00
Hawley Brothers Hardware Company	285.00
J. B. Morrell & Co	267.50
S. C. Forsaith Machine Company‡	259.00
Dunham, Carrigan & Hayden Company *†	260.00
R. A. Robbins	260.00
Class F:	
Hawley Brothers Hardware Company*	262.50
Dunham, Carrigan & Hayden Company	750.00
Albert Gallatin	487.50
W. F. Bowers	750.00
Class G:	
Chas. H. Pleasants	310.92
J. B. Morrell & Co	315.75
Wm. P. Fuller	265.40
Class G—Continued.	
Chas. M. Yates*	$248.21
Class H:	
Chas. H. Pleasants	74.10
Wm. P. Fuller, jr. *	69.00
Chas M. Yates	72.00
Class I:	
S. C. Forsaith Machine Company‡	224.32
Dunham, Carrigan & Hayden Company*	227.70
R. A. Robbins	302.50
Class K:	
Chas. H. Pleasants	57.90
Hawley Brothers Hardware Company	33.00
Dunham, Carrigan & Hayden Company	27.00
Albert Gallatin *	19.50
Class L:	
Chas. H. Pleasants	128.33
Hawley Brothers Hardware Company	100.86
J. B. Morrell & Co	144.40
Dunham, Carrigan & Hayden Company	96.70
Albert Gallatin *	82.03
Class M:	
Chas. H. Pleasants	67.50
Hawley Brothers Hardware Company*	47.50
J. B. Morrell & Co	52.50
Dunham, Carrigan & Hayden Company	50.00
Chas. M. Yates	50.00
Albert Gallatin	50.00
Class N:	
Chas. H. Pleasants	338.74
Hawley Brothers Hardware Company	155.15
Dunham, Carrigan & Hayden Company*	154.64
Albert Gallatin	156.62

Proposals for steam-capstan windlass for the Monadnock, at the Mare Island navy-yard, under Bureau advertisement dated November 17, 1890; opened December 9, 1890.

Class 2:	
American Ship Windlass Company*	$8,385
Union Iron Works	9,900
Class 3—Continued.	
Risdon Iron and Locomotive Works	$10,600
Pacific Iron Works	11,000

Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated December 11, 1890; opened December 30, 1890.

Class A:	
Marc M. Michael*	$485.81
James S. Barron & Co	520.00
Tissot & Schultz	487.50
William Wilson	497.25
Harry L. Briggs	525.50
Joseph Wechsler	546.00
Class C:	
Marc M. Michael	177.40
James S. Barron & Co.*	159.50
Tissot & Schultz	210.00
Joseph Wechsler	170.00
Class D:	
J. H. Sternberg & Son	46.00
Class D—Continued.	
James S. Barron & Co	$42.00
S. C. Forsaith Machine Company	57.00
J. B. Morrell & Co	39.00
Manning, Maxwell & Moore*	36.75
Harry L. Briggs	38.25
Class E:	
James S. Barron & Co.*	2,307.26
J. B. Morrell & Co	2,391.06
Harry L. Briggs	2,422.59
Class F:	
James S. Barron & Co	117.00
Manning, Maxwell & Moore*	114.00

* Accepted. † Decided by lot. ‡ Informal.

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Proposals for naval supplies for the New York navy-yard, etc.—Continued.

Class G:	
James S. Barron & Co	$505.92
Manning, Maxwell & Moore	523.93
Harry L. Briggs*	452.28
James W. Soper	656.11
Class H:	
Charles H. Pleasants	682.40
Hicks & Dickey	624.00
Benjamin Atha & Co.*	492.50
James S. Barron & Co	809.00
J. B. Morrell & Co	639.00
Manning, Maxwell & Moore	765.30
E. J. Temple	804.00
Class I:	
Charles H. Pleasants	1,031.04
Simon Thuebel†	584.31
Charles M. Childs	884.91
James S. Barron & Co	890.15
J. B. Morrell & Co.*	820.72
Stevenson Bro. & Co.†	638.76
William McDonagh & Co.†	722.48
Harry L. Briggs	891.10
Class K:	
James S. Barron & Co	60.80
J. B. Morrell & Co.*	55.10
Class L:	
Hardenbergh & Co	649.85
Joseph Wechsler.*	616.00
Class M:	
James S. Barron & Co	5,332.76
Manning, Maxwell & Moore†	5,313.90
E. J. Temple	6,525.92
Class N:	
Charles H. Pleasants	50.60
James S. Barron & Co.*	45.08
E. J. Temple	50.60
Class O:	
Charles H. Pleasants	372.00
James S. Barron & Co	361.50
S. C. Forsaith Machine Company	335.00
J. B. Morrell & Co	325.00
Manning, Maxwell & Moore*	320.00
E. J. Temple	350.00
Class P:	
Charles H. Pleasants	316.21
Simon Thuebel†	297.94
James S. Barron & Co.*	302.16
Clarendon Oil Company	366.70
J. B. Morrell & Co	302.53
Stevenson Bro. & Co	385.87
William McDonagh & Co	311.70
Manning, Maxwell & Moore	330.05
Class Q:	
Vacuum Oil Company	$650.00
Simon Thuebel†	200.00
Fiske Brothers†	580.00
Stevenson Bro. & Co.*	640.00
Class R:	
Vacuum Oil Company	3,620.00
Manhattan Oil Company	3,911.00
T. J. Gilroy & Co.*	3,122.00
Fiske Brothers	3,872.00
Clarendon Oil Company	3,401.00
Class S:	
Revere Rubber Company	475.00
J. S. Barron & Co	362.50
Tissot & Schultz*	215.00
J. B. Morrell & Co	270.63
Stevenson Bro. & Co	527.50
Harry L. Briggs	359.38
Charles Millar & Son	447.50
Class T:	
Revere Rubber Company	2,395.00
James S. Barron & Co	2,179.60
J. B. Morrell & Co	1,981.00
Gutta Percha and Rubber Manufacturing Company	2,163.20
Harry L. Briggs*	1,914.20
S. F. Hayward & Co	2,001.00
Class U:	
Charles H. Pleasants	355.00
James S. Barron & Co	134.00
J. B. Morrell & Co	132.00
William McDonagh & Co.*	123.50
Class V:	
Charles H. Pleasants	538.50
James S. Barron & Co	303.50
J. B. Morrell & Co.*	277.50
Harry L. Briggs	317.00
Class W:	
Simon Thuebel	57.50
James S. Barron & Co	80.00
J. B. Morrell & Co	49.50
Harry L. Briggs*	49.00
Class X:	
Daniel Leary	.0921
Manhattan Oil Company...per lb	.09⅞
Charles H. Pleasants.....do	.1099
Simon Thuebel.....do	.13¼
Harry L. Briggs.....do	.1123
Emery Candle Company.....do	.0948
R. G. Mitchell.....do	.12

Proposals for machine tools for the League Island navy-yard under Bureau advertisement dated December 8, 1890; opened December 30, 1890.

Class 1:	
Niles Tool Works*	$2,439.00
Manning, Maxwell & Moore	2,500.00
Class 2:	
S. C. Forsaith Machine Company	1,645.00
Henry Warden*	1,500.00
Class 3:	
Wm. Sellers & Co	2,300.00
S. C. Forsaith Machine Company	1,674.00
Niles Tool Works	1,555.00
Manning, Maxwell & Moore*	1,546.00
Class 4:	
Wm. Sellers & Co	2,450.00
S. C. Forsaith Machine Company	1,777.50
Niles Tool Works	1,579.00
Manning, Maxwell & Moore*	1,525.00
Class 5:	
Wm. Sellers & Co	4,500.00
S. C. Forsaith Machine Company	4,420.00
Niles Tool Works	4,239.50
Manning, Maxwell & Moore	4,400.00
Class 6:	
Wm. Sellers & Co	1,580.00
S. C. Forsaith Machine Company	1,186.00
Niles Tool Works*	874.00
Manning, Maxwell & Moore	1,200.00
Class 7:	
Chas. H. Pleasants	449.49
S. C. Forsaith Machine Company	360.00
Class 7—Continued:	
Fitchburg Machine Works	$340.00
Manning, Maxwell & Moore*	315.00
Class 8:	
Wm. Sellers & Co	38,000.00
Niles Tool Works	31,000.00
Bath Iron Works*	18,700.00
Class 9:	
William Sellers & Co	4,050.00
S. C. Forsaith Machine Company†	1,505.00
Niles Tool Works	1,555.00
Manning, Maxwell & Moore*	1,550.00
Class 10:	
S. C. Forsaith Machine Company†	988.00
Chas. J. Field*	1,335.00
Manning, Maxwell & Moore	1,350.00
Class 11:	
Chas. H. Pleasants	251.25
S. C. Forsaith Machine Company	223.00
Chas. J. Field*	143.45
Jas. S. Barron & Co	224.00
Manning, Maxwell & Moore	195.00
E. H. Shannon	225.38
Jas. W. Soper	183.00
Class 12:	
Newton Machine Tool Works*	1,580.00
Class 13:	
S. C. Forsaith Machine Company†	316.00
Manning, Maxwell & Moore*	320.00

*Accepted. †Informal. ‡Accepted for $3,613.94.

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Proposals for equipment stores for the Mare Island navy-yard, under Bureau advertisement dated December 6, 1890, opened December 30, 1890

Class A:	
Neville & Co	$2,242.50
Jas. S. Barron & Co	1,764.15
J. B. Morrell & Co.*	1,759.37
Class B:	
Neville &Co.*	2.123.50
Albert Gallatin	2,238.00
Jas. S. Barron & Co	2,625.00
Dunham, Carrigan & Hayden Co	2,426.50
Chas. H. Pleasants	2,885.25
S. C. Forsaith Machine Co	2,495.75
Class C:	
Jas. S. Barron & Co.*	59.80
Dunham, Carrigan & Hayden Co	60.40
J. B. Morrell & Co	77.00
Class D:	
Wm. Walker	395.00
A. S. Carman	425.00
J. F. Kennedy	375.00
A. Powell*	350.00
Class E:	
Wm. Walker	735.00
Class E—Continued:	
Albert Gallatin	$690.00
J. S. Barron & Co	741.00
Dunham, Carrigan & Hayden Co	765.00
Chas. H. Pleasants	816.00
S. C. Forsaith Machine Co	777.00
Pacific Metal Works*	682.50
Class F:	
Jas. W. Soper	117.44
Albert Gallatin	160,99
Jas. S. Barron & Co	174.66
Dunham, Carrigan & Hayden Co	185.40
S. C. Forsaith Machine Co	138.69
Class G:	
Graton & Knight Manufacturing Co	60.00
Neville & Co	88.00
Albert Gallatin	62.40
Jas. S. Barron & Co	72.00
Dunham, Carrigan & Hayden Co	88.00
S. C. Forsaith Machine Co	71.80
Horatio N. Cook*	57.00

Proposals for equipment stores for the Boston navy-yard, under Bureau advertisement dated December 9, 1890, opened December 30, 1890.

Class A:	
Ansel W. Paine	$51.57
Bolles & Wilde	54.86
Jas. S. Barron & Co.*	28.98
Class B:	
Taylor P. Thompson†	71.00
Fiske, Coleman & Co.*	104.50
Class C:	
Page Belting Co	206.00
S. C. Forsaith Machine Co	213.50
Ansel W. Paine	312.00
Bolles & Wilde	249.00
James S. Barron & Co	200.00
Chas. Millar & Son	277.00
Graton & Knight Manufacturing Co.*	197.50
Class D:	
Bolles & Wilde*	30.00
Class E:	
E. and F. King & Co	68.50
Chas. H. Pleasants	75.74
Bolles & Wilde	70.75
Gould & Cutler*	66.57
Taylor P. Thompson	74.82
Class E—Continued:	
Chas. M. Childs & Co	$69.63
Jas. S. Barron & Co	83.50
Simon Thuebel	71.00
Class F:	
Chas. H. Pleasants	71.79
Ansel W. Paine	50.40
Bolles & Wilde	46.53
Chas. Miller & Son*	38.30
Class G:	
S. C. Forsaith Machine Co	134.64
Ansel W. Paine	31.14
Bolles & Wilde*	27.12
Class H:	
Bolles & Wilde*	30.00
Taylor P. Thompson†	18.00
Class K:	
Stevenson Brothers & Co.*	168.50
Chas. H. Pleasants	231.00
Taylor P. Thompson†	152.25
Simon Thuebel†	104.25
Class L:	
Jas. S. Barron & Co.*	94.17

Proposals for lumber, etc., for the Naval Academy, Annapolis, Md., under Bureau advertisement dated December 10, 1890, opened December 30, 1890.

Class A:	
Wilson & Merriman*	$178.50
William D. Gill	246.50
John Kealy	202.90
Joseph Thomas & Son	213.50
Class B:	
Charles H. Pleasants	45.75
Class B—Continued:	
John Kealy	$50.50
Joseph Thomas & Son*	45.00
James S. Barron & Co	53.50
Class C:	
E. P. Gleason Manufacturing Co	90.00
Joseph Thomas & Son*	60.00

Proposals for steam capstan, windlass, etc., for the New York navy-yard, under Bureau advertisement dated December 15, 1890, opened January 6, 1890.

Class A:	
American Ship Windlass Co.*	$7,050.00
Class B:	
R. A. Robbins	478.50
Manning, Maxwell & Moore*	419.85
George W. Stetson & Co	487.50
Class C:	
Rowland A. Robbins*	347.00
S. C. Forsaith Machine Co	440.00
Class D:	
Joseph Wechsler	3,290.00
Class D—Continued:	
Rowland A. Robbins	$3,229.00
Tissot & Schultz	3,488.00
William F. Bernstein*	2,989.00
Class E:	
Joseph Wechsler	975.00
Rowland A. Robbins	1,099.95
William F. Bernstein*	877.05
Class F:	
Henry J. Vogel*	225.00

*Accepted.

†Informal.

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Proposals for creosoted lumber, etc., for the Norfolk navy-yard, under Bureau advertisement dated December 17, 1890, opened January 6, 1891.

Class 37:	
Charles E. Pell*	$1,593.00
George L. Neville	1,895.00
Class 37—Continued:	
J. W. Gaskill & Sons	$1,644.00
Joseph W. Duryee	1,833.75

Proposals for bending rolls for the Boston navy-yard, under Bureau advertisement dated December 16, 1890, opened January 6, 1891.

Class 38:	
Niles Tool Works	$30,900.00
Wm. Sellers & Co., Inc*	23,750.00
Class 38—Continued:	
Bement, Miles & Co	$34,500.00

Proposals for steam engineering stores for the U. S. S. Mohican, Mare Island, under Bureau advertisement dated December 20, 1890, opened January 13, 1891.

Class A:	
Dunham, Carrigan & Hayden Co.*	$212.90
Class B:	
Arnett & Rivers†	196.00
W. F. Bowers*	200.00
Dunham, Carrigan & Hayden Co	248.00
Class C:	
H. B. Willis	427.55
Class C—Continued:	
Dunham, Carrigan & Hayden Co	$550.55
J. N. Knowles*	396.75
Class D:	
Dunham, Carrigan & Hayden Co.*	15.75
Class E:	
Dunham, Carrigan & Hayden Co.*	36.00

Proposals for coal for the naval station, Key West, Fla., under Bureau advertisement dated December 30, 1890, opened January 20, 1891.

Class 11:	
E. B. Townsend	$6,480.00
Bloomington Mining Co.*	5,640.00
Francis Herbert Clark	5,830.00
Class 11—Continued:	
James Symington	$6,090.00
Samuel G. French	6,140.00
David Duncan & Son	6,950.00

Proposals for fresh provisions for the navy-yard, Mare Island, under Bureau advertisement dated December 19, 1890, opened January 20, 1891.

50,000 pounds fresh beef (per pound):	
Samuel Brown*	$0.06
Jacob Stutz	.08½
50,000 pounds fresh vegetables (per pound):	
Samuel Brown*	.02
Jacob Stutz	.02½
40,000 pounds fresh bread (per pound):	
Brown & Fleming*	$0.02⅞
Jacob Stutz	.04
Joseph Boss	.03½

Proposals for steering engine steel plates, etc., for the New York navy-yard, under Bureau advertisement dated December 29, 1890, opened January 20, 1891.

Class B.:	
Standard Steel Casting Co.*.per lb.	$0.12½
Midvale Steel Co	.15½
Solid Steel Co.:	
Bid A .....per lb..	14½
Bid B	15½
Class C:	
S. C. Forsaith Machine Co	3,955.25
Carnegie, Phipps & Co.*	3,683.82
Class D:	
S. C. Forsaith Machine Co.†	1,120.42
Carnegie, Phipps & Co.*	1,209.54
Class E:	
J. B. Morrell & Co.*	85.26
S. C. Forsaith Machine Co	91.35
J. H. Sternbergh & Son	121.80
Class F:	
South Brooklyn Sawmill Co	565.00
John McClave	775.00
Watson & Pittinger	707.50
Joseph W. Duryee	610.00
Chas. E. Pell	647.75
John F. Stevens	690.00
Class G:	
South Brooklyn Sawmill Co.*	455.20
John McClave	431.60
Watson & Pittinger	419.98
Joseph W. Duryee*	398.40
Chas. E. Pell	512.00
Class H:	
John McClave	831.60
Joseph W. Duryee*	504.00
Chas. E. Pell	667.80
Class I:	
J. B. Morrell & Co	$146.75
Eugene L. Maxwell	122.92
Rowland A. Robbins	134.99
J. H. Sternbergh & Son*	117.30
Class J:	
Tissot & Schultz	12,250.00
Rowland A. Robbins	12,350.00
Joseph Wechsler	11,000.00
J. Freeman Shoe Manufacturing Co.*	8,750.00
Class K:	
B. Y. Pippey & Co.*	3,100.00
Tissot & Schultz	4,300.00
Class L:	
Tissot & Schultz*	330.00
Class M:	
Tissot & Schultz	63.20
Rowland A. Robbins	56.00
Joseph Wechsler*	55.00
Class N:	
Tissot & Schultz*	859.60
Rowland A. Robbins	868.00
Class O:	
J. B. Morrell & Co	175.00
Tissot & Schultz	200.00
Rowland A. Robbins	167.00
Joseph Wechsler*	160.00
Class P:	
Tissot & Schultz*	168.31
Rowland A. Robbins	176.50
Joseph Wechsler	172.50

* Accepted.

† Informal.

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Proposals for naval supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated January 8, 1891; opened January 27, 1891.

Class A:	
Rowland A. Robbins*	$73.68
Reuter & Mallory	82.32
Class B:	
Rowland A. Robbins	393.40
Reuter & Mallory*	318.11
Class C:	
Rowland A. Robbins*	132.40
Reuter & Mallory	149.00
Class F:	
Rowland A. Robbins	95.30
J. W. Bond & Co.*	50.25
Class H:	
Geo. F. Sloan & Bro.*	520.00
John Kealy	663.50
Class I:	
Wm. D. Gill & Son	195.25
Geo. F. Sloan & Bro.*	160.25
John Kealy	206.75
Class J:	
Rowland A. Robbins	122.00
John Kealy	129.40
Chas. H. Pleasants*	108.78
Class K:	
Rowland A. Robbins	236.62
Class K—Continued.	
John Kealy*	$223.90
Class L:	
Rowland A. Robbins	713.75
Gould & Cutler Corporation	510.90
J. B. Morrell & Co	553.81
Chas. M. Childs & Co.*	495.45
John Kealy	670.60
Chas. H. Pleasants	511.80
Class M:	
Rowland A. Robbins	33.00
J. B. Morrell & Co	30.00
John Kealy	32.00
Chas. H. Pleasants*	27.50
Class N:	
John Kealy	55.00
Chas. H. Pleasants*	47.40
Class Q:	
Rowland A. Robbins	36.90
John Kealy	44.17
Chas. H. Pleasants*	33.09
Class R:	
Rowland A. Robbins	56.40
Reuter & Mallory	53.00
Chas. H. Pleasants*	49.50

Proposals for flax, canvas, etc., for the Boston navy-yard, under Bureau advertisement dated January 7, 1891; opened January 27, 1891.

Class A.:	
Rowland A. Robbins	$2,015.40
J. B. Morrell & Co	1,991.90
James Symington*	1,984.87
N. Boynton & Co	2,060.45
Class B:	
R. A. Robbins*	$90.80
J. B. Morrell & Co	48.40
Ansel W. Paine	39.60

Proposals for rolled copper, lumber, etc., for the New York navy-yard, under Bureau advertisement dated January 6, 1891; opened January 27, 1891.

Class A:	
Taunton Copper Manufacturing Company	$3,853.51
Ansonia Brass and Copper Company	3,853.51
Park, Bro. & Co.*	3,645.64
Rowland A. Robbins	3,777.94
J. B. Morrell & Co	3,844.31
S. C. Forsaith Machine Company	4,203.86
Charles H. Pleasants	4,054.49
Charles Millar & Son	4,056.36
James Symington	3,835.08
Eugene L. Maxwell	4,019.47
Tissot & Schultz	3,851.67
Lewisohn Brothers	3,853.54
Class A—Continued.	
Clendenin Brothers	$3,853.51
Revere Copper Company	3,858.53
Class B:	
Charles E. Pell	1,386.00
C. F. Hodsdon	1,995.00
Rowland A. Robbins	1,332.60
Joseph W. Duryee	1,341.00
James Symington*	1,311.00
John McClave	2,287.50
Class C:	
T. J. Gilroy & Co	575.00
Kemp, Day & Co	445.00
Charles F. Mattlage*	399.00

Proposals for cylindrical horizontal tubular boilers, Boston navy-yard, under Bureau advertisement dated December 22, 1890; opened January 27, 1891.

Three tubular boilers:	
Roberts Iron Works Company	$6,090.00
Samuel J. Pope & Co	6,564.00
Edward Kendall & Sons*	4,989.00
Cunningham Iron Works Company	5,120.00
Three tubular boilers—Continued.	
Donegan & Swift	$5,397.00
Whittier Machine Company	5,520.00
S. C. Forsaith Machine Company	5,697.00

Proposals for steel-plate steam fans, engineering stores, provisions, etc., under Bureau advertisement dated January 19, 1891; opened February 10, 1891.

Class A:	
Donegan & Swift	$4,100.00
B. F. Sturtevant & Co.*	3,200.00
Class B:	
James W. Soper	433.07
J. B. Morrell & Co.*	409.15
Harry L. Briggs	496.64
Manning, Maxwell & Moore	429.35
Rowland A. Robbins	456.59
Class C:	
Harry L. Briggs*	$257.30
Rowland A. Robbins	366.60
Class D:	
J. B. Morrell & Co	1,434.05
Donegan & Swift	1,515.07
Harry L. Briggs	1,454.34
Morse Burtis	1,436.15
Manning, Maxwell & Moore	1,357.72

* Accepted.

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Proposals for steel-plate steam fans, engineering stores, provisions, etc.—Continued.

Class D—Continued.	
Rowland A. Robbins	$1,561.40
Tissot & Schultz	1,465.92
Henry McShane & Co.*	1,319.30
Class E:	
Samuel G. French	948.00
David Duncan & Son*	828.75
Class F:	
J. B. Morrell & Co.†	190.00
Donegan and Swift	199.00
Ansonia Brass and Copper Company	190.00
Manning, Maxwell & Moore	196.00
Rowland A. Robbins	204.00
Tissot & Schultz	200.00
Class G:	
James W. Soper	339.64
J. B. Morrell & Co	350.77
Manning, Maxwell & Moore	398.25
Rowland A. Robbins	331.79
Whitely, Spowers & Co.*	331.49
Class H:	
James W. Soper*	45.20
J. B. Morrell & Co	50.00
Donegan & Swift‡	50.00
Morse Burtis	49.50
Manning, Maxwell & Moore	46.00
Rowland A. Robbins	47.00
Henry McShane & Co	47.50
Class I:	
James W. Soper*	539.00
Manning, Maxwell & Moore	574.50
Rowland A. Robbins	590.00
Tissot & Schultz	552.15
Class K:	
Carpenter Steel Company‡	89.40
Rowland A. Robbins*	115.22
Class L:	
J. B. Morrell & Co	143.85
Chas. M. Childs & Co	144.25
Wm. McDonagh & Co.*	138.75
Class M:	
James W. Soper	94.00
J. B. Morrell & Co	95.00
Donegan & Swift	92.00
Morse Burtis	93.00
Manning, Maxwell & Moore	100.00
Rowland A. Robbins*	44.00
Tissot & Schultz	106.00
Henry McShane & Co	107.00
Class N:	
J. B. Morrell & Co	80.00
Donegan & Swift	76.00
Manning, Maxwell & Moore*	52.25
Rowland A. Robbins	77.00
Class O:	
James W. Soper	$41.45
Manning, Maxwell & Moore*	38.43
Tissot & Schultz	44.31
Class P:	
James W. Soper*	23.85
J. B. Morrill & Co	27.00
Donegan & Swift	25.50
Manning, Maxwell & Moore	29.97
Rowland A. Robbins	32.10
Class Q:	
J. B. Morrell & Co	75.00
Rowland A. Robbins*	55.00
Class R, 50 barrels wheat flour (per barrel):	
Patterson & Holt‡	5.25
J. B. Morrell & Co*	5.40
Francis H. Leggett & Co	5.60
Class S, 4,000 gallons beans (per gallon):	
Patterson & Holt	.38
Charles F. Mattlage*	.37½
C. Burkhalter & Co	.39
Rowland A. Robbins	.46
Kemp, Day & Co	.37 9/10
Class T, 20,000 pounds salt beef:	
Charles F. Mattlage*..per barrel	9.43
J. B. Morrell & Co.....per pound	.05½
Francis H. Leggett & Co.....do	.04 77/100
Class U, 10,000 pounds rice (per pound):	
Patterson & Holt	.06¾
J. B. Morrell & Co	.07 45/100
Francis H. Leggett & Co.*	.06¾
Thurber, Whyland & Co	.07 43/100
Rowland A. Robbins	.07 9/10
Kemp, Day & Co	.08
Class V, 5,000 pounds tea (per pound):	
Robert G. Thomas	.28
Patterson & Holt	.29½
J. B. Morrell & Co	.30½
Thomas Reid	.28 74/100
C. Burkhalter & Co	.33
Francis H. Leggett & Co.*	.27 83/100
Rowland A. Robbins	.33 9/10
Kemp, Day & Co	.32
Class W, 50,000 pounds sugar (per pound):	
Patterson & Holt‡	.06⅞
Francis H. Leggett & Co	.06¾
Thurber, Whyland & Co.*	.06 85/100
Rowland A. Robbins	.06 83/100
Class X, 1,000 gallons sirup (per gallon):	
Patterson & Holt‡	.32½
Francis H. Leggett & Co.*	.37
Rowland A. Robbins	.43

Proposals for steel plate steam fans, engineering stores, etc., for the Norfolk navy-yard, under Bureau advertisement dated January 22, 1891, opened February 10, 1891.

Class A:	
Mayer & Co.*	$138.21
White & Dodson	153.57
Charles H. Pleasants	174.40
George L. Neville	163.28
Donegan & Swift	172.50
R. A. Robbins	153.61
Class B:	
Mayer & Co.*	122.08
White & Dodson	135.48
George L. Neville	142.62
Donegan & Swift	144.44
R. A. Robbins	222.20
Class C:	
Mayer & Co	11.22
White & Dodson	13.80
Charles H. Pleasants	12.08
George L. Neville*	10.15
R. A. Robbins	17.25
Carpenter Steel Company	20.70
Class D:	
Mayer & Co.*	60.50
White & Dodson	65.00
Charles H. Pleasants	75.00
Class D—Continued.	
George L. Neville	$67.50
Gould & Cutler	70.00
Charles M. Childs & Co.*	80.00
R. A. Robbins	72.00
Class E:	
Mayer & Co	147.34
White & Dodson	122.59
Charles H. Pleasants	136.85
George L. Neville	131.09
Gould & Cutler	125.98
Charles M. Childs & Co.*	120.92
R. A. Robbins	140.26
Class F:	
Charles H. Pleasants*	47.40
Class H:	
George L. Neville	2,500.00
Nottingham & Wrenn	1,625.00
William Lamb & Co.*	1,575.00
Class I:	
Donegan & Swift	5,050.00
B. F. Sturtevant & Co.*	3,750.00
Class K:	
Carnegie, Phippe & Co.*	5,958.40

*Accepted. †Decided by lot. ‡Informal.

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Proposals for electrical supplies, etc., for the Naval-Training Station, Newport, R. I., under Bureau advertisement dated January 21, 1891, opened February 10, 1891.

Class A:	
Tissot & Schultz*	$83.80
Scannesin & Potter	85.35
Ansel W. Paine	104.05
Class B:	
Charles H. Pleasants*	154.39
Ansel W. Paine	162.91
Class C:	
Ansel W. Paine*	34.20
Class D:	
Charles H. Pleasants*	$39.52
Ansel W. Paine	58.40
Class E:	
Charles H. Pleasants*	59.75
Ansel W. Paine	75.00

Proposals for lumber, etc., for the navy-yard, Mare Island, Cal., under Bureau advertisement dated January 9, 1891, opened February 10, 1891.

Class A:	
A. S. Carman	$786.46
A. Powell	813.55
William Walker	721.88
C. A. Hooper & Co.*	718.54
Class B:	
A. S. Carman	203.50
A. Powell	242.00
William Walker	211.75
C. A. Hooper*	184.25
Class C:	
Dunham, Carrigan & Hayden Co.	$54.39
W. R. S. Foye*	53.60
Charles H. Pleasants	99.44
Class D:	
Dunham, Carrigan & Hayden Co	32.86
W. R. S. Foye*	29.50
Charles H. Pleasants	38.07
Class E:	
Charles H. Pleasants*	48.60

Proposals for building material for the Portsmouth navy-yard, under Bureau advertisement dated January 29, 1891, opened February 24, 1891.

Class A:	
Charles H. Pleasants	$163.52
Ansel W. Paine	178.73
J. B. Morrell & Co.*	136.16
Rider & Cotton	144.70
Class B:	
Charles H. Pleasants	150.59
Ansel W. Paine	192.90
J. B. Morrell & Co.*	146.88
Rider & Cotton	158.25
Class C:	
Charles H. Pleasants	56.19
Ansel W. Paine	55.25
J. B. Morrell & Co	54.50
Rider & Cotton*	51.75
Class D:	
Charles M. Childs & Co.*	390.00
Charles H. Pleasants	421.00
Ansel W. Paine	470.00
Rider & Cotton	405.00
Class E:	
Charles M. Childs & Co	23.95
Gould & Cutler*	20.00
Charles H. Pleasants	22.72
Ansel W. Paine	25.00
J. B. Morrell & Co	28.40
Rider & Cotton	26.30
Class F:	
George Willett Andrews*	496.33
Class G:	
Ansel W. Paine*	599.50
Class H:	
John H. Broughton	$481.20
Ansel W. Paine*	440.00
Class I:	
Charles H. Pleasants	150.00
Ansel W. Paine*	62.50
Rider & Cotton	75.00
Class J:	
Charles H. Pleasants*	81.85
Ansel W. Paine	89.00
J. B. Morrell & Co	100.00
Rider & Cotton	118.00
Class K:	
Charles H. Pleasants	42.75
Ansel W. Paine	40.50
J. B. Morrell & Co	37.50
Rider & Cotton*	36.00
Class L:	
Charles M. Childs & Co.*	62.25
Gould & Cutler	62.75
Charles H. Pleasants	63.68
Ansel W. Paine	72.50
J. B. Morrell & Co	68.00
Rider & Cotton	66.00
Class M:	
John H. Broughton*	2,840.00
J. W. Gaskell & Sons	3,378.60
Class N:	
John H. Broughton*	1,627.50
Ansel W. Paine	1,743.00

Proposals for creosoted lumber, iron pipe, etc., for the Norfolk navy-yard, under Bureau advertisement dated January 31, 1891, opened February 24, 1891.

Class A:	
Old Dominion Creosoting Works	$6,603.84
Jesse I. Eppinger *	6,412.85
Class B:	
James Symington	4,158.86
R. A. Robbins	3,556.60
Class B—Continued.	
Henry McShane & Co	$3,506.22
Donegan & Swift *	3,293.18
Jas. W. Soper	3,383.48
Mayer & Co	3,814.60

* Accepted.

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Proposals for steam engineering stores for the Mare Island navy-yard, under Bureau advertisement dated January 20, 1891, opened February 24, 1891.

Class A:	
Albert Gallatin*	$122.42
Chas. H. Pleasants	166.98
Hawley Brothers Hardware Co	172.93
Dunham, Carrigan & Hayden Co	123.58
Class B:	
J. F. Kennedy	670.00
A. Powell	560.00
Wm. Walker	510.00
A. S. Carman*	499.00
Class C:	
Albert Gallatin*	220.00
Chas. H. Pleasants	245.00
Austin & Phelps	250.00
Dunham, Carrigan & Hayden Co	245.00
Levi M. Kellogg	240.00
Class D:	
Albert Gallatin	57.00
Chas. H. Pleasants	67.20
Austin & Phelps	72.00
Dunham, Carrigan & Hayden Co.*	54.00
Class E:	
Albert Gallatin*	121.45
Chas. H. Pleasants	238.12
Austin & Phelps	126.25
Park Bros. & Co., limited	317.50
Dunham, Carrigan & Hayden Co	137.55
Class F:	
W. F. Bowers	$750.00
Albert Gallatin	656.25
Hawley Brothers Hardware Co	750.00
Arnett & Rivers	502.50
Dunham, Carrigan & Hayden Co	825.00
Chas. H. Pleasants*	142.50
Class G:	
Mack & Co	65.40
Chas. H. Pleasants*	61.25
Class H:	
Mack & Co*	49.00
Chas. H. Pleasants	52.00
Class I:	
Albert Gallatin	377.51
Chas. H. Pleasants	362.14
James W. Soper*	354.17
Hawley Brothers Hardware Co	390.93
Dunham, Carrigan & Hayden Co	388.50
Levi M. Kellogg	484.90
Class K:	
R. A. Robbins*	123.00
Chas. H. Pleasants	157.00
Austin & Phelps	154.50
Dunham, Carrigan & Hayden Co	194.00

Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated February 10, 1891, opened March 3, 1891.

Class A:	
R. A. Robbins	$678.40
John H. Tissot, jr	779.95
H. L. Briggs	716.90
J. B. Morrell & Co.*	661.00
Class B:	
S. C. Forsaith Machine Co	381.75
Charles H. Pleasants	409.86
R. A. Robbins	383.70
H. L. Briggs	372.20
E. L. Maxwell*	337.07
Jas. W. Soper	374.70
Class C:	
Charles H. Pleasants	292.72
R. A. Robbins	252.18
Harry L. Briggs	256.74
E. L. Maxwell	239.73
J. B. Morrell & Co.*	236.37
Jas. W. Soper	297.10
Class D:	
R. A. Robbins	32.40
H. L. Briggs	18.50
E. L. Maxwell*	12.20
Jas. W. Soper	15.35
Class E:	
Charles H. Pleasants	35.28
R. A. Robbins	33.40
H. L. Briggs*	28.50
E. L. Maxwell	30.24
J. B. Morrell & Co	33.50
Class F:	
Charles H. Pleasants	50.60
R. A. Robbins	51.48
George L. Neville	65.56
E. L. Maxwell	44.00
J. B. Morrell & Co.*	43.12
Jas. W. Soper	57.20
Class G:	
Charles M. Childs & Co.*	63.50
E. L. Maxwell	65.00
Class H:	
Charles H. Pleasants	245.80
R. A. Robbins	202.00
George L. Neville	194.92
H. L. Briggs	187.70
E. L. Maxwell*	174.60
J. B. Morrell & Co	228.70
Jas. W. Soper	183.20
Class I:	
Solid Steel Co	7,028.56
Standard Steel Casting Co	7,458.88
Harry L. Briggs	33,564.96
Benjamin Atha & Co.*	6,741.68
Class K:	
John L. Schultz*	$3,863.35
R. A. Robbins	3,900.70
George L. Neville	4,079.20
Jas. Symington	4,075.00
J. B. Morrell & Co	3,949.40
Class L:	
R. A. Robbins	309.50
Geo. L. Neville	300.00
E. L. Maxwell	245.00
J. B. Morrell & Co.*	225.00
Class M:	
Chas. H. Pleasants*	31.14
Chas. M. Childs & Co	18.00
J. B. Morrell & Co	32.20
Class O:	
David Duncan & Son	1,696.00
Henry W. Peacock	1,716.00
Barber & Ziegler	1,668.00
Sam'l G. French	1,624.00
David S. Wells*	1,616.00
Class P:	
R. A. Robbins	390.00
John H. Tissot, jr.*	350.40
Marc M. Michael	352.40
Class Q:	
John L. Schults*	59,244.00
Henry T. Kent	59,400.00
B. Y. Pippey & Co	64,200.00
Class R:	
John L. Schults	1,998.00
R. A. Robbins*	1,969.50
James Symington	2,098.50
Joseph Wechsler	2,061.00
J. B. Morrell & Co	2,000.00
Class S:	
John L. Schults*	1,956.00
R. A. Robbins	2,042.00
James Symington	2,098.00
Joseph Wechsler	2,248.00
J. B. Morrell & Co	2,038.00
Class T:	
Francis H. Leggett & Co.*	19,430.00
C. Burkhalter & Co	20,375.00
James Symington	29,740.00
Thurber, Whyland & Co	19,910.00
Class U:	
R. A. Robbins	4,337.50
John Early*	3,858.50
John H. Tissot, jr	4,243.50
Wm. Shaw	4,447.92
Joseph Wechsler	4,648.50
J. B. Morrell & Co	4,375.00

*Accepted.

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Proposals for naval supplies for the New York navy-yard, etc.—Continued.

Class V:	
R. A. Robbins*	$111.00
Thos. G. Hood	119.70
John H. Tissot, jr	112.50
Harry L. Briggs	127.50
Marc M. Michael	120.00
Joseph Wechsler	112.50
Class W:	
R. A. Robbins	5,412.50
Class W—Continued.	
H. L. Briggs	$5,187.50
Richard M. Colgate	6,062.50
Chas. McKeone	4,762.50
Class X:	
R. A. Robbins	264.50
John Early	295.00
Harry L. Briggs	292.50
Wm. Vogel	275.00

Proposals for hoisting engine, lumber, etc., for the Norfolk navy-yard, under Bureau advertisement dated February 25, 1891; opened March 17, 1891.

Class A:	
Williamson Brothers	$1,228.00
H. T. Morrison & Co.*	913.00
Class B:	
The American Ship Windlass Co.*	295.00
Class D:	
Wm. P. Dodson*	190.68
S. C. Forsaith Machine Company	240.00
Geo. L. Neville	326.40
Class E:	
Joseph W. Duryee	3,315.00
J. W. Gaskill & Sons	2,635.00
John C. Emerson	3,391.50
Geo. L. Neville	2,333.25
Bingham, Mosely & Co.*	2,040.00
A. A. McCullough	3,825.00
Class F:	
Wm. P. Dodson	124.00
Chas. H. Pleasants	127.60
Chas. A. Moore*	114.00
Billany & Cochrane	136.00
Geo. L. Neville	119.40
Class G:	
Morton, Reed & Co	520.00
Wm. P. Dodson	690.00
Mineralized Rubber Co	560.00
Chas H. Pleasants	990.00
Chas. A. Moore	750.00
Melville Lindsay*	490.00
Geo. L. Neville	597.00
Class H:	
Wm. P. Dodson	72.00
Chas. H. Pleasants	95.81
Chas. A. Moore	70.55
Geo. L. Neville*	68.21
Class I:	
Wm. P. Dodson	27.00
R. A. Robbins	32.50
Chas. A. Moore*	20.00
Class I—Continued.	
Geo. L. Neville	$25.00
Class K:	
Joseph W. Duryee	969.00
J. W. Gaskell & Sons	1,041.00
John C. Emmerson	1,185.00
Geo. L. Neville*	946.00
A. A. McCullough	1,185.00
Class L:	
Wm. P. Dodson	269.84
Chas. H. Pleasants	274.56
R. A. Robbins	291.48
Chas. A. Moore	318.34
Geo. L. Neville*	253.19
Class M:	
Wm. P. Dodson	178.85
Chas. H. Pleasants	181.74
Chas. M. Childs & Co.*	165.25
Geo. L. Neville	181.50
Class N:	
Wm. P. Dodson	40.00
Chas. A. Moore	31.75
Geo. L. Neville*	28.45
Class O:	
Wm. P. Dodson	34.80
Chas. H. Pleasants	42.12
Chas. A. Moore	31.44
Billany & Cochrane	36.84
Geo. L. Neville*	25.30
Class P:	
Wm. P. Dodson	24.00
Chas. H. Pleasants	20.50
R. A. Robbins	33.00
Geo. L. Neville*†	20.50
Class Q:	
Wm. P. Dodson	205.65
R. A. Robbins*	173.42
Geo. L. Neville	244.90

Proposals for equipment stores for the New York navy-yard, under Bureau advertisement dated March 2, 1891; opened March 24, 1891.

Class A:	
J. B. Morrell & Co.*	$2,119.44
R. A. Robbins	2,465.45
H. L. Briggs	2,414.80
Class B:	
J. B. Morrell & Co	123.00
R. A. Robbins	131.00
Charles W. Childs & Co	155.00
Charles H. Pleasants*	99.90
George L. Neville	160.00
Class C:	
J. B. Morrell & Co.*	1,585.65
R. A. Robbins	1,635.50
H. L. Briggs	1,764.50
Class D:	
William A. Wheeler	437.50
J. B. Morrell & Co	499.50
R. A. Robbins	493.50
Tissot & Schultz	525.00
Charles H. Pleasants*	430.00
Class E:	
J. B. Morrell & Co	1,081.00
Eureka Fire Hose Co	1,252.50
Gutta Percha and Rubber Manufacturing Co	1,069.80
Class E—Continued.	
Harry L. Briggs*	$1,006.80
Revere Rubber Co	1,105.00
Class F:	
J. B. Morrell & Co	325.00
R. A. Robbins*	317.75
Eureka Fire Hose Co	422.50
Gutta Percha and Rubber Manufacturing Co	379.00
Class G:	
J. B. Morrell & Co	2,025.00
R. A. Robbins	2,025.00
E. L. Maxwell*	2,013.00
Tissot & Schultz	2,040.00
George L. Neville	2,382.00
Class H:	
William A. Shaw	490.05
J. B. Morrell & Co.*	481.93
R. A. Robbins	487.65
H. L. Briggs	487.83
Class I:	
J. B. Morrell & Co.*	469.15
R. A. Robbins	513.70
H. L. Briggs	499.50

* Accepted.

† Decided by lot.

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Proposals for equipment stores for the New York navy-yard, etc.—Continued.

Class K:	
Arthur & Bonnell	$2,070.10
R. A. Robbins*	1,559.00
Tissot & Schultz	1,640.75
Class L:	
William A. Shaw	700.95
J. B. Morrell & Co.*	706.50
R. A. Robbins	735.20
Class M:	
J. B. Morrell & Co.*	1,368.05
R. A. Robbins	1,399.50
Tissot & Schultz	1,372.10
Class N:	
Charles H. Pleasants*	48.20
Class O:	
J. B. Morrell & Co	19.50
R. A. Robbins*†	19.50
Charles M. Childs & Co	22.50
E. L. Maxwell	22.80
Charles H. Pleasants	21.00
George L. Neville	30.00
Class P:	
S. C. Forsaith Machine Co.*	27.28
R. A. Robbins	26.95
E. L. Maxwell	26.56
Class P—Continued.	
William H. Spowers*	$22.00
Charles H. Pleasants	23.10
Class Q:	
William A. Wheeler	231.00
S. C. Forsaith Machine Co.*	223.75
J. B. Morrell & Co	233.75
R. A. Robbins	239.75
F. W. C. Crane‡	177.00
E. L. Maxwell	235.50
Class R:	
William A. Wheeler	435.00
J. B. Morrell & Co	428.50
R. A. Robbins	446.70
E. J. Temple	960.00
E. L. Maxwell	600.00
William H. Spowers*	420.00
George L. Neville	960.00
Class S:	
J. B. Morrell & Co.*	556.00
R. A. Robbins	600.70
E. L. Maxwell	582.00
William H. Spowers	588.00
George L. Neville	950.00

Proposals for equipment stores for the Boston navy-yard, under Bureau advertisement dated March 4, 1891, opened March 24, 1891.

Class A:§	
David Duncan & Son	$1,237.50
Ansel W. Paine	623.75
R. A. Robbins	650.00
Class B:	
S. C. Forsaith Machine Co.*	661.65
R. A. Robbins	664.70
Class C:	
Ansel W. Paine*	66.00
R. A. Robbins	67.20
Chas. H. Pleasants	78.00
Class D:	
Geo. L. Neville	160.20
Ansel W. Paine	137.00
R. A. Robbins	138.40
Taylor P. Thompson	138.78
J. B. Morrell & Co.*	135.45
Chas. H. Pleasants	199.97
Class E:	
Tissot & Schultz	1,932.50
R. A. Robbins	1,907.80
James Symington	1,972.00
J. B. Morrell & Co.*	1,879.11
Class F:	
Ansel W. Paine	143.25
R. A. Robbins*	140.65
Taylor P. Thompson	144.50
J. B. Morrell & Co	153.85
Class G:	
Ansel W. Paine	130.00
R. A. Robbins	104.00
Taylor P. Thompson*	83.00
Class H:	
Geo. L. Neville*	60.00
Ansel W. Paine	75.00
R. A. Robbins	63.00
Class I:	
Geo. L. Neville	$85.00
R. A. Robbins	87.00
Chas. M. Childs & Co	69.10
J. B. Morrell & Co	78.50
E. & F. King & Co.*	67.00
Chas. H. Pleasants	69.00
Class K:	
Ansel W. Paine	62.50
Taylor P. Thompson*	60.00
Chas. H. Pleasants	60.25
Class L:	
Ansel W. Paine	406.00
R. A. Robbins	450.00
Chas. M. Childs & Co	412.00
Taylor P. Thompson*	376.00
Chas. H. Pleasants	384.00
Class M:	
Ansel W. Paine	23.28
R. A. Robbins	29.75
J. B. Morrell & Co	24.40
Chas. H. Pleasants*	22.96
Class N:	
Ansel W. Paine	68.54
R. A. Robbins	85.60
J. B. Morrell & Co	71.30
Chas. H. Pleasants	110.12
Geo. D. Putnam*	38.12
Class O:	
Geo. L. Neville	85.00
Ansel W. Paine	90.50
R. A. Robbins	80.00
Taylor P. Thompson	84.00
J. B. Morrell & Co	85.50
Chas. H. Pleasants*	78.75

Proposals for coal for naval training station, Newport R. I., under Bureau advertisement dated March 3, 1891; opened March 24, 1891.

Class A:	
Samuel G. French	$968.00
Bloomington Mining Co.	998.00
Class A—Continued.	
David Duncan & Son	$1,096.00
Gardner B. Reynolds*	960.00

Proposals for coal for the naval station, Key West, Fla., under Bureau advertisement dated March 9, 1891; opened March 24, 1891.

Class 11:	
Francis H. Clark	$5,675.00
Bloomington Mining Co	5,580.00
Jas. Symington	5,940.00
Class 11—Continued.	
Daniel G. French*	$5,580.00
David Duncan & Son	6,490.00
E. B. Townsend	6,020.00

* Accepted. † Decided by lot. ‡ Informal. § Class not awarded.

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Proposals for tobacco for the New York navy-yard, under Bureau advertisement, dated February 24, 1891; opened March 31, 1891.

120,000 pounds navy tobacco (per pound):	
Perkins & Ernst	$0.37
Howard W. Spurr	.35
Myers Bros. & Co	.31
J. B. Morrell & Co.:	
Bid A	.32⅜
Bid B	.34⅜

120,000 pounds navy tobacco—Continued.	
P. H. Mayo & Bro	$0.32
R. A. Robbins	.34 21/100
Geo. D. Finlay	.32
Manchester Tobacco Co.*	.29
David C. Lyall	.33
Francis H. Leggett & Co	.31 74/100

Proposals for creosoted pine, etc., for the Norfolk navy-yard, under Bureau advertisement dated March 11, 1891; opened March 31, 1891.

Class A:	
Jesse I. Eppinger	$756.88
Old Dominion Creosote Co	541.97
Geo. L. Neville	587.70
Richard Lamb*	505.36
Class B:	
Geo. L. Neville*	59.00
White & Dodson	80.00
Class C:	
Geo. L. Neville*	83.15
White & Dodson	84.30
Class D:	
Geo. L. Neville	$120.00
White & Dodson*	84.00
Class E:	
Chas. M. Childs & Co	102.00
Geo. L. Neville	95.25
White & Dodson*	86.00
Class F:	
Geo. L. Neville	36.40
White & Dodson*	33.80

Proposals for lumber, etc., for the League Island navy-yard, under Bureau advertisement dated March 12, 1891; opened March 31, 1891.

Class A:	
J. W. Gaskill & Son*	$430.50
Chas. Maule	444.80
Class C:	
Chas. M. Childs & Co	$118.00
Roller & Shoemaker*	58.38

Proposals for ordnance stores for the Washington navy-yard, under Bureau advertisement dated March 13, 1891; opened March 31, 1891.

Class A:	
J. B. Morrell & Co	$582.70
R. A. Robbins	508.50
H. L. Briggs	491.15
J. B. Kendall*	262.41
E. L. Maxwell	442.85
Billany & Cochrane	463.75
Class B:	
C. F. Carter & Co	218.34
J. B. Morrell & Co	253.00
R. A. Robbins	274.80
H. L. Briggs	251.42
White & Dodson	283.55
George Ryneal, jr	293.41
J. B. Kendall	281.00
E. L. Maxwell*	216.18
Class C:	
R. A. Robbins*	1,736.00
J. B. Kendall	2,383.12
Class F:	
Charles T. Carter & Co	321.16
R. A. Robbins	359.75
H. L. Briggs*	286.33
White & Dodson	318.10
J. H. Chesley & Co	299.00
E. L. Maxwell	299.22
Billany & Cochrane	334.05
Class G:	
Morton, Reed & Co	4,551.60
Melville Lindsay	3,779.80
S. C. Forsaith Machine Co	4,399.94
William C. Codd	5,270.18
J. B. Morrell & Co	4,049.98
Herkner & Stine	4,145.55
R. A. Robbins	4,424.05
H. L. Briggs	4,339.30
J. B. Kendall	4,581.45
Page Belting Co	4,048.60
Graton & Knight Manufacturing Company*	3,548.00
E. L. Maxwell	5,139.20
Class H:	
J. W. Duryee*	$437.00
Class I:	
J. B. Morrell & Co	38.50
R. A. Robbins	41.00
White & Dodson	52.50
J. H. Chesley & Co*	43.50
J. B. Kendall	44.25
Charles H. Pleasants*	34.10
E. L. Maxwell	46.00
J. W. Soper	39.31
Class K:	
J. B. Morrell & Co	2,200.00
R. A. Robbins*	2,111.00
White & Dodson	2,143.00
J. H. Chesley & Co	2,112.50
J. B. Kendall	2,180.00
Charles H. Pleasants	2,235.00
James W. Soper	2,249.00
Class L:	
J. B. Morrell & Co	310.00
R. A. Robbins	305.50
White & Dodson	297.00
J. H. Chesley & Co.*	281.25
J. B. Kendall	287.50
E. J. Temple	312.50
Charles H. Pleasants	306.25
James W. Soper	288.00
Class M:	
Midvale Steel Co	1,518.62
Carpenter Steel Co	2,415.80
John Illingworth & Co.*	1,363.17
E. J. Temple	1,565.35
Class N:	
R. A. Robbins	568.00
White & Dodson	592.50
J. B. Kendall*	493.25
E. J. Temple	495.00
Charles H. Pleasants	630.35

* Accepted.

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***Proposals for ordnance stores for the Washington navy-yard, etc.*—Continued.**

Class O:	
Melville Lindsay	$64.00
S. C. Forsaith Machine Co	57.25
William C. Codd	171.00
J. B. Morrell & Co	104.80
H. L. Briggs*	55.00
Mineralized Rubber Co	119.80
Henry J. M. Howard	183.00
Page Belting Co	67.50
Class P:	
William C. Codd	306.75
H. L. Briggs	202.65
Henry J. M. Howard	286.08
Page Belting Co.*	167.72
E. L. Maxwell	205.75
Class Q:	
Charles M. Childs & Co	1,546.52
White & Dodson	1,688.95
George Ryneal, jr.*	1,524.95
Charles H. Pleasants	1,597.04
Class R:	
Charles H. Pleasants*	236.00
Class S:	
John H. Tissot, jr	$2,156.50
R. A. Robbins	2,005.61
H. L. Briggs	2,033.71
J. B. Kendall	2,156.52
E. L. Maxwell	1,989.73
James W. Soper*	1,919.07
Class S—Files:	
John H. Tissot, jr	1,995.23
R. A. Robbins	1,893.79
H. L. Briggs	1,867.43
H. T. Wakeman	2,145.88
J. H. Chesley & Co	2,192.45
J. B. Kendall	2,043.43
E. J. Temple	2,098.69
E. L. Maxwell*	1,825.96
James W. Soper	1,925.25
Morton, Reed & Co	1,873.63
Class T:	
R. A. Robbins*	1,090.50
White & Dodson	1,288.00
J. B. Kendall	1,165.17
Charles H. Pleasants	1,293.42

Proposals for provisions, clothing, etc., for the New York navy-yard, under Bureau advertisement dated March 5, 1891; opened March 31, 1891.

5,500 pounds oatmeal (per pound):	
J. B. Morrell & Co.*	$0.05¼
Francis H. Leggett & Co	.05 47/100
Kemp, Day & Co	.05 49/100
Chas. E. Ahrens	.05 48/100
Thurber, Whyland & Co	.05 49/100
50,000 pounds wheat flour (per pound):†	
Rowland & Co	.0279 14/100
Chas. T. Goodwin & Son	.02¾
R. A. Robbins	.03 1/100
J. B. Morrell & Co.*	.02 7/8
Francis H. Leggett & Co	.02 48/100
W. H. Fleeman	.02 8/8
Chas. E. Ahrens	.02 99/100
Thurber, Whyland & Co	.02 99/100
60,000 pounds salt pork (per pound):	
Chas. F. Mattlage‡	.06 33/100
Francis H. Leggett Co	.07¾
Figge & Bro	.06 33/100
1,200 gallons beans (per gallon):	
C. Burkhalter & Co.*	.32
Chas. F. Mattlage	.34½
J. B. Morrell & Co	.33
Francis H. Leggett & Co	.33⅓
Kemp, Day & Co	.36 5/8
Chas. E. Ahrens	.37
600 gallons peas (per gallon):	
C. Burkhalter & Co.*‡	.25
Kemp, Day & Co	.25
Chas. E. Ahrens	.27
10,000 pounds rice (per pound):	
R. A. Robbins	.07 48/100
F. H. Leggett & Co	.06 48/100
Kemp, Day & Co	.07½
Chas. E. Ahrens*	.06 99/100
Thurber, Whyland & Co	.06 99/100
2,000 pounds dried apples (per pound):	
Kemp, Day & Co	.18 5/8
Chas. E. Ahrens*	.17½
Thurber, Whyland & Co	.18¾
3,000 pounds prunes (per pound):	
F. H. Leggett & Co	.14¾
Kemp, Day & Co	.13 7/8
Chas. E. Ahrens*	.13½
Thurber, Whyland & Co	.16 48/100
1,500 pounds bacon (per pound):	
Chas. F. Mattlage*	.09 48/100
Kemp, Day & Co	.10½
Armour & Co	.10
Figge & Bro	.09½
10,000 pounds sausage (per pound):	
Francis H. Leggett & Co.*	.10 7/100
Kemp, Day & Co	.12
Armour & Co	.13
Henry M. Anthony	.10 48/100
Thurber, Whyland & Co	.10½
2,500 pounds fish (per pound):	
Kemp, Day & Co.*	$0.09½
Charles E. Ahrens	.11
55,000 pounds sugar (per pound):	
Francis H. Leggett & Co.*	.04 45/100
James Symington	.05¼
Charles E. Ahrens	.04 47/100
Thurber, Whyland & Co	.04 7/100
1,500 gallons vinegar (per gallon):	
F. Foehrenbach	.16
Kemp, Day & Co	.19½
Charles E. Ahrens*	.13½
4,000 pounds tinned vegetables (per pound):	
C. Burkhalter & Co.§	.04½
F. H. Leggett & Co.*	.06 33/100
Kemp, Day & Co	.07½
5,000 pairs calfskin shoes (each):	
Joseph Wechsler	1.74 48/100
Monroes, Packard & Linscott*	1.64½
George F. Roedel	1.69½
R. A. Robbins	2.17
J. Freeman Shoe Manufacturing Co	1.73
10,000 pairs woolen socks (each):	
Stanley J. Benner	.37 7/100
B. Y. Pippey & Co.*	.34
15,000 neckerchiefs (each):	
Joseph Wechsler	.95 97/100
William W. Foulkrod*	.91 98/100
Stanley J. Benner	.98 99/100
R. A. Robbins	.96 73/100
5,000 watch caps (each):	
Joseph Wechsler	.46 74/100
Stanley J. Benner§	.42 73/100
Horstmann Bros. & Co.*	.44½
B. Y. Pippey & Co	.40
5,000 yards cloth for coats, jackets, and caps (per yard):	
Sullivan, Vail & Co	1.90¾
Liberty Woolen Manufacturing Co.	2.07
B. Y. Pippey & Co	1.92
Wendell, Fay & Co.*	1.89 48/100
4,000 mattresses (each):‖	
Joseph Wechsler*	2.99 75/100
John H. Tissot, jr	3.23
R. A. Robbins	3.14 7/8
William F. Bernstein	3.14½
James Symington	3.49
8,000 mattress covers (each):	
Joseph Wechsler*	.59 98/100
Ehrich Bros	.60
J. B. Morrell & Co	.60½
William F. Bernstein	.62
5,000 blankets (each):	
Joseph Wechsler	2.42½
S. Allen Evans	2.40½

* Accepted.
† Award made for 29,400 pounds.
‡ Decided by lot.
§ Informal.
‖ Award made for 2,000 matresses.

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Proposals for provisions, clothing, etc., for the New York navy-yard, etc.—Continued.

5,000 blankets (each)—Continued.	
B. Y. Pippey & Co.*	$2.32
5,000 yards cloth for trousers (per yard):	
Sullivan, Vail & Co	2.28⅞
Liberty Woolen Manufacturing Co.	2.25⅛
B. Y. Pippey & Co	2.34
Wendell, Fay & Co	2.28 88/100
5,000 pieces linen tape (per piece):	
R. A. Robbins*	.01¼
25,000 spools sewing silk (each):	
Joseph Wechsler*	.03
John H. Tissot, jr	.03 24/100
Leonard O. Smith†	.02 9/16
Teft, Weller & Co	.03½
Ansel W. Paine	.04
2,000 dozen rubber buttons (per dozen):	
Joseph Wechsler	.03¾
William W. Foulkrod	.03 1/100
John H. Tissot, jr*	.03 1/100
R. A. Robbins	.03 7/16
Teft, Weller & Co	.04
5,000 jackknives (each):	
H. L. Briggs	.41 9/16
John H. Tissot, jr	.42 XX/100
R. A. Robbins	.42
Ansel W. Paine*	.40
500 mess pans (each):	
R. A. Robbins	$0.44
William Vogel*	.38
1,000 blacking brushes (each):	
Joseph Wechsler*	.20½
Harry L. Briggs	.21 4/16
Patrick Cavnnaugh	.22 11/16
R. A. Robbins	.21 11/16
J. B. Morrell & Co	.20 5/16
2,000 scrub brushes (each):	
Joseph Wechsler	.24 12/16
Harry L. Briggs	.27 1/16
Patrick Cavanaugh	.38 14/16
R. A. Robbins	.28 7/16
J. B. Morrell & Co*	.21
2,000 wisp brooms (each):	
Joseph Wechsler	.14 75/100
Harry L. Briggs*	.13 4/16
Patrick Cavanaugh	.13 50/100
R. A. Robbins	.15 3/16
Ansel W. Paine	.14
Class 33—enameled cloth, etc.:	
Joseph Wechsler	1,068.50
Harry L. Briggs	1,036.25
John H. Tissot, jr	1,115.00
R. A. Robbins*	1,001.45
J. B. Morrell & Co	1,102.50

Proposals for stationery for the Union Iron Works, San Francisco, Cal., under Bureau advertisement dated March 10, 1891; opened April 7, 1891.

Class A:*	
Le Conte Brothers	$354.40
Dutton & Partridge	331.17
Class A—Continued.	
H. S. Crocker & Co*	$324.75

Proposal for lumber and equipment stores for the Norfolk navy-yard, under Bureau advertisement dated March 18, 1891 opened; April 7, 1891.

Class A:	
S. G. Armstrong	$6,891.19
Bingham, Mosely & Co.	6,423.05
L. H. Hoagland*	5,629.63
George L. Neville	6,216.55
Class C:	
W. H. Hyatt	850.00
George L. Neville*	816.00
Class D:	
R. A. Robbins	306.80
J. B. Morrell & Co	310.94
George L. Neville*	275.50
Class E:	
R. A. Robbins	1,662.00
J. B. Morrell & Co	1,876.00
F. M. Peed*	1,650.00
George L. Neville	1,723.00
Class F:	
R. A. Robbins	868.80
J. B. Morrell & Co.*	851.95
F. M. Peed	967.00
George L. Neville	885.81
John H. Tissot, jr	876.85
Class G:	
R. A. Robbins	56.90
J. B. Morrell & Co	69.00
George L. Neville	123.00
Charles H. Pleasants*	28.23
Class H:	
Mineralized Rubber Co	264.00
J. B. Morrell & Co.*	178.50
Class H—Continued.	
S. C. Forsaith Machine Co	$229.50
George L. Neville	200.00
Class I:	
R. A. Robbins	32.00
Charles M. Childs & Co	36.50
J. B. Morrell & Co	28.00
George L. Neville	35.00
Charles H. Pleasants*	20.50
Class K:	
R. A. Robbins	122.64
Charles M. Childs & Co.*	102.84
J. B. Morrell & Co	104.64
F. M. Peed	113.40
George L. Neville	118.55
Charles H. Pleasants	125.16
Class L:	
R. A. Robbins	164.64
J. B. Morrell & Co	144.60
F. M. Peed	142.80
George L. Neville	150.00
Charles H. Pleasants*	119.34
Class M:	
R. A. Robbins	154.24
P. H. Brouellet*	116.24
Hume & Bilisoly	133.96
George L. Neville	250.40
Charles H. Pleasants	210.53
Class N:	
Pocahontas Coal Co.*	1,750.00

*Accepted.

†Informal.

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Proposals for building material, dredging, etc., for the New York navy-yard, under Bureau advertisement dated March 18, 1891; opened April 7, 1891.

Class A:	
R. A. Robbins	$4,246.00
John J. Donovan*	3,938.00
James Symington	4,048.00
Alexander J. Howell	4,059.00
John A. Bouker	4,290.00
Class B:	
R. A. Robbins	672.00
John J. Donovan*	472.00
Alexander J. Howell	556.00
John J. Bouker	520.00
Class C:	
R. A. Robbins	5,202.00
James Symington	5,087.25
George Pierce*	4,551.75
Booth Bros. and Hurricane Isle Granite Co	5,106.37
Class D:	
T. F. Booth	7,357.80
R. A. Robbins	8,394.20
Charles E. Pell	7,477.05
George Karr & Co.*	7,293.00
John McClave	8,814.00
Joseph W. Duryee	8,370.75
James Bigler	7,736.00
George L. Neville	8,999.50
Graves & Steers	7,730.00
Class E:	
Samuel G. French	636.00
David Duncan & Son	636.00
Barber & Ziegler*	606.00
Class F:	
R. A. Robbins	5,456.00
James Brand*	5,434.00
Baetzer & Meyerstein	5,500.00
Charles J. Stevens	5,608.00
Sinclair & Babson	5,874.00
Howard Fleming	5,698.00
Class G:	
T. F. Booth	14,361.26
R. A. Robbins	17,847.55
Charles E. Pell	17,369.52
Isaac Eppinger	16,380.60
John McClave	14,651.60
Wheelwright & Hewitt*	13,779.60
Joseph W. Duryee	15,320.51
South Boston Sawmill Co	15,738.60
Class G—Continued.	
James Bigler	$15,391.20
George L. Neville	14,631.60
Graves & Steers	15,310.20
Watson & Pittinger	15,356.22
Class H:	
R. A. Robbins	297.90
J. H. Sternbergh & Son*	213.00
Charles A. Moore	217.00
S. C. Forsaith Machine Co	230.00
J. B. Morrell & Co	226.00
James W. Soper	310.90
George L. Neville	220.00
Class I:	
R. A. Robbins	2,158.00
J. H. Sternbergh & Son*	1,703.20
Charles A. Moore	2,484.12
Donegan & Swift	1,948.39
S. C. Forsaith Machine Co	2,326.60
J. B. Morrell & Co	2,007.74
George L. Neville	1,941.49
Class K:	
R. A. Robbins	170.00
Charles A. Moore	164.00
Donegan & Swift*	156.00
S. C. Forsaith Machine Co	206.00
J. B. Morrell & Co	202.00
James W. Soper	167.60
George L. Neville	162.50
Class L:	
R. A. Robbins	507.90
Charles E. Pell	334.56
John McClave*	286.00
Joseph W. Duryee	299.20
South Boston Sawmill	302.50
Watson & Pittinger	349.00
Class M:	
R. A. Robbins*	434.80
James W. Soper	550.00
Class N:	
R. A. Robbins*	628.20
S. C. Forsaith Machine Co	678.00
J. B. Morrell & Co	687.60
George L. Neville	720.00
Class O:	
The Atlantic Dredging Co	1,830.00
W. H. Beard Dredging Co.*	1,800.00

Proposals for building material, equipment stores, etc., for the Mare Island navy-yard, under Bureau advertisement dated March 10, 1891; opened April 7, 1891.

Class A:	
J. B. Morrell & Co	$407.57
Albert Gallatin	376.31
Chas. H. Pleasants*	371.59
Dunham, Carrigan & Hayden Co	469.21
Class C:	
S. C. Forsaith Machine Co	132.00
Albert Gallatin*	106.80
Revere Rubber Co	162.00
Arnett & Rivers	156.00
Dunham, Carrigan & Hayden Co	150.00
Class D:	
The Graton & Knight Manufacturing Co.*	136.75
Albert Gallatin	322.00
Revere Rubber Company	151.50
Arnett & Rivers	150.50
Chas. H. Pleasants	237.10
Dunham, Carrigan & Hayden Co	155.10
Class E:	
Wm. Walker	431.00
A. Powell	495.50
C. A. Hooper	412.00
A. S. Carman*	405.00
Class F:	
Chas. H. Pleasants	$249.01
W. F. Whittier*	221.30
Class G:	
Albert Gallatin*	111.25
Dunham, Carrigan & Hayden Co	112.50
Class H:	
Albert Gallatin*	28.90
Dunham, Carrigan & Hayden Co	35.16
Class I:	
Albert Gallatin*	46.80
Dunham, Carrigan & Hayden Co	60.00
Class K:	
Wm. Walker*	151.00
A. Powell	292.50
A. S. Carman	265.00
Class L:	
Louis E. Lake*	453.00
Dunham, Carrigan & Hayden Co	631.50
Class N:	
Neville & Co	423.50
Chas. H. Pleasants*	409.40

*Accepted.

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Proposals for hemp for the navy-yard, Boston, under Bureau advertisement dated March 25, 1891; opened April 14, 1891.

Class A:	
S. C. Forsaith Machine Co	$19,264.00
Pearson Cordage Co.*	16,665.60
R. A. Robbins	19,520.00
Ansel W. Paine	22,400.00
George W. Lawrence	20,000.00
George H. Allen	18,780.00
Class B:	
S. C. Forsaith Machine Co	$1,990.00
R. C. Morgan & Co.*	1,904.00
H. B. Nelson & Brother	1,934.00
A. Davis Weld	1,949.00

Proposals for engineering stores for the New York navy-yard, under Bureau advertisement dated April 11, 1891; opened April 28, 1891.

Class A:	
Chas. H. Pleasants	$1,030.00
Barber & Ziegler*	800.00
S. G. French	805.00
David Duncan	818.00
David S. Wells	806.00
Class B:	
R. A. Robbins*	614.71
J. B. Morrell & Co	803.06
Class C:	
McDonagh & Co.*	2,483.28
R. A. Robbins	2,712.91
C. T. Reynolds & Co	2,690.74
Chas. H. Pleasants	2,569.31
Chas. M. Childs & Co	2,538.93
Feigel & Brother	2,537.81
J. B. Morrell & Co	2,848.12
Class D:	
R. A. Robbins*	169.20
J. B. Morrell & Co	186.00
Class E:	
R. A. Robbins	643.50
Melville Lindsay*	545.00
Gutta Percha Rubber Manufacturing Co	565.00
Class E—Continued:	
J. B. Morrell & Co	$595.00
Class F:	
R. A. Robbins*	219.94
J. B. Morrell & Co	253.20
Class G:	
R. A. Robbins*	126.00
Chas. H. Pleasants	131.25
Feigel & Brother	127.50
J. B. Morrell & Co	125.00
Class H:	
Chas. H. Pleasants*	110.25
Class I:	
Jas. MacBeth & Co	1,240.00
Manhattan Oil Co.*	1,195.00
Vacumm Oil Co	1,500.00
Clarendon Oil Co	1,380.00
Fred'k B. Fiske	1,369.00
Class K:	
Jas. MacBeth & Co	500.00
Manhattan Oil Co	297.50
Borne Scrymser & Co	480.00
Vacumm Oil Co	650.00
Clarendon Oil Co.*	170.00
Fred'k B. Fiske	550.00

Proposals for mantels for the navy-yard, Washington, D. C., under Bureau advertisement dated April 8, 1891; opened April 28, 1891.

Class A:	
Hayward & Hutchinson*	$432.00
Barber & Ross	471.78
Mobley & Schemmerman	475.05
Biddle Slate Mantel Company	600.00
Thos. W. Smith	751.05
Class B:	
Barber & Ross*	$212.04
Class C:	
Barber & Ross*	24.80

Proposals for lumber, etc., for the Naval Academy, Annapolis, Md., under Bureau advertisement dated April 7, 1891; opened April 28, 1891.

Class F:	
Julius Lansburgh	$928.50
Class F—Continued:	
Wm. B. Moses & Son*	$919.00

Proposals for lumber, etc., for the Norfolk navy-yard under Bureau advertisement dated April 10, 1891; opened April 28, 1891.

Class A:	
Geo. L. Neville*	$11,105.96
Class B:	
Geo. L. Neville	1,169.64
W. C. Cooke*	810.00
Class C:	
Geo. L. Neville	644.50
Norfolk Timber Company	569.80
W. C. Cooke*	423.50
Class D:	
Geo. L. Neville*	$429.00
R. A. Robbins	479.00
Melville Lindsey	600.00
E. V. White & Co	569.00

Proposals for carpets, etc., for the League Island navy-yard, under Bureau advertisement dated April 9, 1891; opened April 28, 1891.

Class A:	
Paul J. Field, jr.*	$44.40
Class B:	
Wm. B. Moses & Son	295.65
Boyd, White & Co	348.75
Thompson & Coxe	317.95
Julius Lansburgh*	290.55
Class D:	
Roller & Shoemaker*	$21.00
Paul J. Field, jr	24.00
Class E:	
Roller & Shoemaker	183.50
Chask, Smith & Co*	167.00
Stevenson Bro. & Co	168.00

*Accepted.

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Proposals for coal for the Norfolk navy-yard, under Bureau advertisement dated April 13, 1891; opened April 28, 1891.

Class A:	
Pocahontas Coal Company*	$15,750.00

Proposals for ordnance stores for the Washington navy-yard, under Bureau advertisement dated April 14, 1891; opened May 5, 1891.

Class A:	
Morse Burtis	$484.80
J. B. Kendall	475.20
S. C. Forsaith Machine Co.*	462.00
J. H. Chesley & Co	489.12
R. A. Robbins	489.60
C. H. Raymond	492.00
Class B:	
Joseph Wechsler*	1,495.00
R. A. Robbins	1,900.00
Class C:	
J. B. Kendall*	109.64
John Illingworth & Co	126.73
Park Bro. & Co	296.96
Benj. Atha & Co	138.94
E. J. Temple	136.59
Carpenter Steel Co	247.08
Hicks & Dicky	178.64
R. A. Robbins	130.15
Class D:	
J. B. Kendall	1,158.04
John Illingworth & Co.*	698.12
Midvale Steel Co	1,531.46
Park Bro. & Co., Limited	1,896.71
E. J. Temple	2,321.88
Carpenter Steel Co	2,889.47
Class E:	
J. B. Kendall	2,064.00
John Illingworth Company	2,484.00
Midvale Steel Co	1,629.50
Sanderson Brothers Steel Co	3,354.00
Park Bro. & Co.*	1,535.10
Benj. Atha & Co	3,160.49
E. J. Temple	3,870.00
Class E—Continued.	
Carpenter Steel Co	$3,096.00
Hicks & Dickey	2,451.00
R. A. Robbins	3,021.60
Class F:	
J. B. Kendall*	1,537.96
Class G:	
W. C. Robinson & Son	2,400 00
Manhattan Oil Co	2,150.00
Geo. Ryneal, jr	2,170.00
Fred'k P. Reed	2,200.00
Fred'k B. Fiske*	2,140.00
Class H:	
J. B. Kendall	500.00
John F. Clarke*	425.00
Class I:	
J. B. Kendall	8,925.00
S. C. Forsaith Machine Co.:	
Bid A*	7,035.00
Bid B	8,280.00
Chas. E. Coffin	9,300.00
Barnum Richardson & Co	9,600.00
Class K:	
J. B. Kendall*	129.30
Donegan & Swift	133.21
J. B. Morrell & Co	198.75
S. C. Forsaith Machine Co	155.58
R. A. Robbins	146.39
C. H. Raymond	203.00
Class L:	
J. B. Kendall	159.90
S. C. Forsaith Machine Co.*	158.00
R. A. Robbins	179.80

Proposals for granite paving blocks, provisions, etc., for the New York navy-yard, under Bureau advertisement dated April 16, 1891, opened May 5, 1891.

Class A:	
James Symington*	$7,490.00
R. A. Robbins	8,397.00
Gregory Cox	9,000.00
Class B:	
Alex. J. Howell	483.75
R. A. Robbins*	465.00
Gregory Cox	600.00
Class C:	
Morse Burtis	2,336.00
R. A. Robbins*	1,601.00
Class D:	
Donegan & Swift	848.00
Class D—Continued.	
Morse Burtis*	$804.60
E. L. Maxwell	1,022.36
S. C. Forsaith Machine Co	986.00
R. A. Robbins	882.60
Class E:	
Chas. F. Mattlage	3,729.00
Francis H. Leggett & Co	4,050.00
Armour & Co.*	3,600.00
Class F:	
Francis H. Leggett & Co.*	1,057.00

Proposals for naval supplies for the Naval Academy, under Bureau advertisement dated April 15, 1891, opened May 5, 1891.

Class C:	
Chas. H. Classen	$3,802.00
Geo. N. Potee.*	3,443.00
John Kealy	5,058.25
Class E:	
David Duncan & Son	825.00
John Kealy	825.00
Wm. L. Read.*	637.50
Class G:	
J. B. Morrell & Co.*	46.80
John Kealy	61.00
Class I:	
J. B. Morrell & Co.*	184.50
J. H. Chesley & Co	188.75
Wm. P. Dodson	194.00
Class I—Continued.	
John Kealy	$242.24
Class K:	
Chas. M. Childs & Co.*	395.01
J. B. Morrell & Co	467.07
Wm. P. Dodson	444.45
Class M:	
J. B. Morrell & Co	154.36
J. H. Chesley & Co	119.92
Wm. P. Dodson*	107.95
Class N:	
J. B. Morrell & Co	401.61
J. H. Chesley & Co.*	329.65
Wm. P. Dodson	366.19

* Accepted.

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Proposals for coal for naval station, Key West, Fla., under Bureau advertisement dated April 17, 1891, opened May 5, 1891.

Class 11:	
Samuel G. French	$8,130.00
Bloomington Mining Co	8,280.00
David Duncan & Son*	8,085.00
Class 11—Continued:	
E. B. Townsend	$8,325.00
Francis H. Clark	8,469.00

Proposals for lumber, etc., for the Norfolk navy-yard, under Bureau advertisement dated April 29, 1891, opened May 19, 1891.

Class A:	
Lewis H. Hoagland*	$1,378.00
George L. Neville	1,529.00
J. W. Gaskill & Sons	6,159.86
Class B:	
Lewis H. Hoagland	15,709.00
Jesse I. Eppinger*	8,831.25
George L. Neville	11,577.45
J. W. Gaskill & Sons	15,307.50
Class D:	
J. H. Sternbergh & Son	$58.68
J. B. Morrell & Co	62.75
George L. Neville*	56.91
Donegan & Swift	60.50
Class E:	
J. B. Morrell & Co	1,411.65
George L. Neville	945.58
Donegan & Swift*	681.35

Proposals for water pipe and pipe fittings for the Portsmouth, N. H., navy-yard, under Bureau advertisement dated May 9, 1891, opened June 2, 1891.

Class A:	
Pancoast & Rogers*	$1,907.38

Proposals for naval supplies for naval training station, Newport, R. I., under Bureau advertisement dated May 13, 1891, opened June 2, 1891.

Class A:	
Tissot & Schults*	$90.77
Class D:	
Chas. M. Childs & Co.*	228.15
J. B. Morrell & Co	279.89
Class D—Continued.	
Ansel W. Paine	$374.17
Gould & Cutler	257.48
Chas. H. Pleasants	245.53
Ira B. White	361.60

Proposals for lumber, etc., for the League Island navy-yard, under Bureau advertisement dated May 14, 1891, opened June 2, 1891.

Class B:	
J. W. Gaskill & Sons*	$550.62
Class C:	
Dwight F. Walker*	223.97
Class C—Continued.	
S. C. Forsaith Machine Co	$298.62
Paul J. Field, jr	283.08

Proposals for naval supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated May 11, 1891, opened June 2, 1891.

Class A:	
Francis T. Witte*	$52.10
Ira B. White	104.00
Class A—Continued.	
J. B. Morrell & Co	$84.56

Proposals for railroad material for the Washington navy-yard under Bureau advertisement dated May 8, 1891, opened June 2, 1891.

Class A:	
Thompson C. Gill—	
Bid A	$37,390.00
Bid B	26,180.00
Chas. E. Coffin	29,000.00
S. C. Forsaith Machine Co	24,650.00
J. B. Kendall	27,300.00
Daniel L. Cobb*	23,740.00
R. A. Robbins	27,230.00
Class B:	
Joseph W. Duryee	445.75
J. W. Gaskill & Sons*	377.00
Class C:	
Merchant & Co	1,050.00
Thompson C. Gill & Co.*	837.20
J. H. Chesley & Co	882.00
Class C—Continued.	
S. C. Forsaith Machine Co	$994.00
J. B. Kendall	1,152.30
R. A. Robbins	942.30
Colwell Lead Co	1,078.00
J. B. Morrell & Co	1,153.60
Class D:	
Merchant & Co	96.60
Thompson C. Gill & Co	104.79
J. H. Chesley & Co.*	92.73
Chas. H. Pleasants	101.77
S. C. Forsaith Machine Co	101.77
J. B. Kendall	97.81
R. A. Robbins	102.63
Colwell Lead Co	94.87
J. B. Morrell & Co	106.00

Accepted.

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Proposals for railroad material for the Washington navy-yard, etc.—Continued.

Class E:	
Merchant & Co	$68. 25
J. H. Chesley & Co	59. 62
Chas. H. Pleasants	69. 55
S. C. Forsaith Machine Co	125. 87
J. B. Kendall*	58. 30
R. A. Robbins	79. 50
J. B. Morrell & Co	112. 63
Class F:	
Thompson C. Gill	296 35
J. B. Kendall	295. 05
R. A. Robbins	307. 55
J. B. Morrell & Co.*	287. 25
Class G:	
Thompson C. Gill*	1, 064. 00
S. C. Forsaith Machine Co	1, 382 03
Class G—Continued.	
J. B. Kendall	$1, 257. 59
R. A. Robbins	1, 284. 14
J. B. Morrell & Co	1, 328. 85
Class H:	
Thompson C. Gill	92. 00
J. H. Chesley & Co	83. 75
Chas. H. Pleasants	86. 65
S. C. Forsaith Machine Co	104. 30
J. B. Kendall*	71. 92
R. A. Robbins	78. 51
J. B. Morrell & Co	81. 50
Class I:	
Joseph W. Duryee	1, 256. 59
John Hoffman	961. 45
D. C. Alexander*	900. 84

Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated May 12, 1891; opened June 2, 1891.

Class A:	
H. L. Briggs	$277. 50
R. A. Robbins*	255. 00
Class B:	
C. and C. Electric Motor Co	4, 161. 50
Edison General Electric Co.*	3, 493. 88
John H. Tissot, jr	3, 542. 00
U. S. Electric Lighting Co	3, 786. 12
Class C:	
New York Insulated Wire Co.*	3, 279. 84
C. & C. Electric Motor Co	3, 611. 26
Edison General Electric Co	3, 446. 51
John H. Tissot, jr	5, 497. 25
R. A. Robbins	3, 453. 24
Class D:	
Charles E. Tell*†	625. 00
George Karr & Co	750. 00
Joseph W. Duryee	625. 00
Valentine Stortz	1, 200. 00
Class E:	
J. B. Morrell & Co	27. 60
E. L. Maxwell	26. 60
R. A. Robbins*	24. 80
Ira B. White	39. 30
Class F:	
J. B. Morrell & Co*	93. 89
E. L. Maxwell	110. 60
R. A. Robbins	102. 54
Ira B. White	168. 85
Class G:	
H. L. Briggs*	33. 00
R. A. Robbins	37. 00
Class H:	
J. B. Morrell & Co	120. 25
Frances T. Witte	206. 66
E. L. Maxwell	118. 45
H. L. Briggs*	103. 51
R. A. Robbins	107. 16
Ira B. White	148. 80
Class I:	
J. B. Morrell & Co.*	70. 50
S. C. Forsaith Machine Co	73. 15
E. L. Maxwell	94. 55
R. A. Robbins	87. 85
Class K:	
Charles E. Pell	520. 00
Joseph W. Duryee	476. 64
Watson and Pittinger*	425. 00
Valentine Stortz	469. 36
Class L:	
S. C. Forsaith Machine Co	195. 34
E. L. Maxwell*	160. 01
H. L. Briggs	167. 11
R. A. Robbins	181. 09
Class M:	
J. B. Morrell & Co	$32. 50
E. L. Maxwell*	30. 00
Chas. H. Pleasants	37. 50
Class N:	
J. B. Morrell & Co	66. 50
E. L. Maxwell	70. 00
Chas. H. Pleasants*†	66. 50
R. A. Robbins	70. 00
Class O:	
J. B. Morrell & Co	437. 40
R. A. Robbins*	373. 40
Ira B. White	430. 50
Class P:	
Chas. H. Pleasants*	311. 20
Class Q:	
J. B. Morrell & Co.*	1, 389. 38
Chas. M. Childs & Co	1. 408. 71
James H. Taylor	1, 473. 93
Gould & Cutler	1, 560. 65
Chas. H. Pleasants	1, 469. 81
Wm. McDonagh	1, 418. 85
Ira B. White	1, 597. 15
Class R:	
J. B. Morrell &Co.*	68. 50
R. A. Robbins	74. 60
Ira B. White	78. 00
Class S:	
J. B. Morrell & Co.*	208. 93
Francis T. Witte	397. 10
H. L. Briggs	244. 10
R. A. Robbins	281. 43
Ira B. White	417. 02
Class T:	
Chas. H. Pleasants	33. 75
R. A. Robbins*	32. 70
Class U:	
J. B. Morrell & Co.*	1, 250. 00
A. Schrader & Son	1. 266. 00
Melville Lindsay	1, 520. 00
Class V:	
S. C. Forsaith Machine Co	203. 28
E. L. Maxwell*†	203. 28
R. A. Robbins	231. 84
Class W:	
C. & C. Electric Motor Co.*	3, 140. 00
John H. Tissott, jr	3. 177. 80
Class X:	
S. C. Forsaith Machine Co	136. 50
E. L. Maxwell*	133. 00
R. A. Robbins	137. 80
Class Y:	
Duparquet Huot Moneuse Co	4, 207. 00
Smith & Anthony Stove Co.‡	4, 020. 00
Bramhall, Deane & Co.*	3, 948. 00

Proposals for butter for the New York navy-yard, under Bureau advertisement dated May 25, 1891; opened June 9, 1891.

Class A:	
Simpson McIntire & Co .. per lb..	$0. 27$\frac{85}{100}$
Class A—continued.	
Chas E. Ahrens*.....do...	$0. 25$\frac{1}{16}$

* Accepted. † Decided by lot. ‡ Informal.

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APPENDIX M.

Statement showing expenditures to June 30, 1891, on vessels authorized or completed since March 3, 1885.

	Payments under contract.	To contractors' extra work.	Work at navy-yards, Bureau Construction and Repair.	Work at navy-yards, Bureau Steam Engineering.	Work at navy-yards, Bureau Equipment.	Cost of construction.	Armament.	Equipment.	Premiums.	Repairs since completion.
Newark	$1,199,450.00	$35,322.41	$69,142.65	$5,515.83	.....	$1,309,430.89	$169,448.22	$115,695.80	$36,857.70	$430.20
Charleston	1,013,113.98	62,613.91	88,776.21	.....	.....	1,164,504.10	181,954.05	121,500.55	.....	33,040.05
Yorktown	446,250.00	15,610.81	18,381.84	.....	.....	480,242.65	114,247.78	60,095.36	39,826.00	31,416.59
Petrel	246,515.00	3,440.85	54,626.76	3,175.34	$238.60	307,996.55	51,280.37	70,033.79	.....	14,570.76
Baltimore	1,317,325.00	35,614.14	61,707.98	8,508.70	3,349.11	1,426,504.93	209,294.92	118,446.91	106,441.80	1,394.05
Vesuvius	310,028.65	.....	7,526.68	.....	.....	317,555.33	.....	8,020.40	.....	10,984.98
Maine	463,050.00	6,528.68	1,093,247.02	1,246.78	168.27	1,564,240.75	.....	.....	.....	.....
Texas	285,525.00	.....	616,341.99	2,180.30	.....	904,047.29	.....	.....	.....	.....
Cushing	82,750.00	15,910.29	6.00	.....	.....	98,666.29	.....	1,809.95	.....	6,118.89
Philadelphia	1,295,450.00	28,718.38	68,627.46	3,373.33	3,167.02	1,399,336.19	196,298.62	98,386.04	100,000.00	15,951.87
San Francisco	1,423,231.50	47,739.94	119,943.60	15,394.46	1,333.07	1,607,642.57	183,471.70	120,233.81	100,000.00	747.68
Concord	462,750.00	22,527.62	41,376.07	1,232.43	1,475.42	529,362.14	81,888.42	66,458.55	.....	1,748.22
Bennington	435,896.50	21,647.96	27,126.86	2,310.76	816.33	487,798.41	80,328.11	51,429.76	.....	.....
Monterey	1,057,213.98	.....	33,610.56	3,161.24	.....	1,093,985.78	.....	.....	.....	.....
New York	1,253,700.00	.....	28,224.53	6,375.54	.....	1,288,300.07	.....	.....	.....	.....
Cruiser No. 6	377,160.00	.....	17,305.35	2,254.08	.....	396,719.43	.....	.....	.....	.....
Cincinnati	.....	.....	304,059.13	189,114.23	.....	493,173.36	.....	.....	.....	.....
Raleigh	.....	.....	339,892.35	188,908.39	.....	528,800.74	.....	.....	.....	.....
Cruiser No. 9	330,750.00	.....	10,812.35	919.57	.....	342,481.92	.....	.....	.....	.....
Cruiser No. 10	330,750.00	.....	9,819.71	863.47	.....	341,433.18	.....	.....	.....	.....
Cruiser No. 11	272,970.00	.....	11,449.88	651.79	.....	285,071.67	.....	.....	.....	.....
Practice cruiser	56,250.00	.....	6,214.71	330.00	.....	62,794.71	.....	.....	.....	.....
Gunboat No. 5	114,660.00	.....	7,151.49	738.75	.....	122,550.24	.....	.....	.....	.....
Gunboat No. 6	114,660.00	.....	4,819.67	640.23	.....	120,119.90	.....	.....	.....	.....
Puritan prior to Aug. 3, 1886	.....	.....	514,428.50	467,333.96	.....	981,762.46	.....	.....	.....	.....
since Aug. 3, 1886	.....	.....	119,105.67	18,709.15	.....	137,814.82	.....	.....	.....	.....
Monadnock, prior to Aug. 3, 1886	.....	.....	586,501.28	36,204.59	.....	622,705.87	.....	.....	.....	.....
since Aug. 3, 1886	.....	.....	111,462.45	165,598.42	.....	277,060.87	.....	.....	.....	.....
Amphitrite, prior to Aug. 3, 1886	.....	.....	414,192.96	163,038.71	.....	577,231.67	.....	.....	.....	.....
since Aug. 3, 1886	.....	.....	122,553.14	67,101.02	.....	189,654.16	.....	.....	.....	.....
Terror, prior to Aug. 3, 1886	.....	.....	436,811.73	163,038.80	.....	599,850.53	.....	.....	.....	.....
since Aug. 3, 1886	.....	.....	327,309.98	1,524.26	.....	328,834.24	.....	.....	.....	.....
Miantonomoh, prior to Mar. 3, 1887	.....	.....	1,007,072.48	475,828.31	.....	1,482,900.79	.....	.....	.....	.....
Miantonomoh, since Mar. 3, 1887	.....	.....	472,771.88	80,706.75	780.26	554,258.89	.....	.....	.....	.....
Cruiser No. 12	490,500.00	.....	7,299.48	3,098.38	.....	500,897.86	.....	.....	.....	.....
Tugboat No. 1	11,677.68	.....	.....	.....	.....	11,677.68	.....	.....	.....	.....
Tugboat No. 2	11,677.68	.....	.....	.....	.....	11,677.68	.....	.....	.....	.....
Tugboat No. 3	11,677.68	.....	.....	.....	.....	11,677.68	.....	.....	.....	.....

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Triton*	35,000.00					35,000.00				
Chicago			25,950.01	7,197.77	481.43	†1,183,629.21	292,257.50	111,986.71		42,765.46
Atlanta						†700,000.00	177,912.75	95,480.99		44,510.59
Boston						†700,000.00	178,280.89	88,248.45		61,002.97
Dolphin						†350,000.00	34,278.79	87,715.68		31,955.69
Torpedo cruiser			5,726.26	1,350.50		7,076.76				
Harbor defense ram			4,827.08	1,343.06		6,170.14				
Indiana			5,537.14	1,965.87		7,503.01				
Massachusetts			5,406.89	2,599.07		8,005.96				
Oregon			5,567.58	1,989.37		7,556.95				
Cruiser No. 13			2,113.72	1,185.08		3,298.80				
Total	13,449,982.65	295,674.99	7,214,829.68	2,096,708.29	11,809.51	25,969,005.12	1,950,942.12	1,165,492.75	333,124.50	296,630.00

*Purchased.

† Appraised value July 1, 1899, and including $33,629.21 expended in completion of Chicago since appraisement.

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APPENDIX N.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the Bureau of Provisions and Clothing, Navy Department.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES.			
One chief clerk (act Mar. 3, 1891, Rev. Stat., p. 27, sec. 167)..	$1,800.00		
Two clerks class 4 (act Mar. 3, 1891, Rev. Stat., p. 70, sec. 416).	3,600 00		
Four clerks, class 3 (act Mar. 3, 1891).....	6,400.00		
Three clerks, class 2 (same act).....	4,200.00		
Two stenographers, class 2 (same act).....	2,800.00		
Eleven clerks, class 1 (same act).....	13,200.00		
Two clerks, class $1,000 (same act)	2,000.00		
Two copyists, class $900 (same act).....	1,800.00		
One assistant messenger (same act)	720.00		
Two laborers, $660 (same act)	1,320.00		
One clerk (submitted).....	1,200.00		
One clerk (submitted).....	1,000.00		
		$40,040.00	$37,840.00
PROVISIONS, NAVY.			
(Act May 12, 1879, Rev. Stat., p. 733, secs. 3709, 3747; act Mar. 2, 1891, vol. 21, p. 3, sec. 1.)			
For provisions and commuted rations for seamen and for marines serving on board United States vessels, commuted rations for naval cadets and for officers on sea duty, commuted rations stopped on account of sick in hospital and credited to the "hospital fund," subsistence of officers and men when unavoidably detained or absent from vessel to which attached under orders (during such subsistence their rations to be stopped on board ship and no credit for commutation therefor to be given); for labor and expenses in general storehouses and yard pay offices (not to exceed $100,000) and for fresh water for drinking and cooking purposes on board naval vessels; in all	1,100,000.00	1,100,000.00	1,100,000.00
CONTINGENT.			
For freight and express charges, candles for the naval service, fuel for offices in navy-yards, books, blanks, and stationery, furniture for general storehouses and yard pay offices; expenses of the naval clothing factory and machinery for same; stationery and other incidental expenses of boards of inspection, foreign postage, telegrams, telephones, tolls, bridge and ferry tickets, car fare, ice, yeomans' stores, iron safes, newspapers, advertising, printing, and all other necessary incidental expenses. (Act Mar. 2, 1891.)	50,000.00	50,000.00	40,000.00
NOTE.—An increase of $10,000 is asked for, as the present appropriation is insufficient for the needs of the service.			
CONSOLIDATING NAVAL SUPPLIES.			
For the completion of the work of arranging, classifying, consolidating and cataloguing supplies for the Navy....	10,000.00	10,000.00	.....
NOTE.—$10,000 was appropriated by act of June 30, 1890, for the purposes mentioned, which amount was expended during the fiscal year 1891. An additional $10,000 is required to complete the work authorized.			
CIVIL ESTABLISHMENT.			
(Act Jan. 30, 1885, Vol. 23, p. 295, sec. 3; act Mar. 2, 1891.)			
Navy-yard, Portsmouth, N. H.: In general storehouses: 2 bookkeepers, at $1,200 per annum, $2,400; 1 assistant bookkeeper, at $720; 1 bill clerk, at $1,000; 1 assistant bill clerk, at $720; 1 receiving and shipping clerk, at $1,000	5,840.00		
Navy-yard, Boston, Mass.: In general storehouses: 1 bookkeeper, at $1,017.25; 1 shipping clerk, at $1,000; 1 receiving clerk, at $1,000; 1 writer, in yard pay office, at $1,017.25.	4,034.50		
Navy-yard, League Island, Pa.: In general storehouses: 1 bookkeeper, at $1,200; 1 assistant bookkeeper, at $720..,	1,920.00		

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Estimates of appropriations required for the service, etc.—Continued.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
CIVIL ESTABLISHMENT—continued.			
Torpedo Station, Newport, R. I.: 1 clerk at $1,200	1,200.00		
Naval Academy, Annapolis, Md.: In general storehouse: 1 bookkeeper, at $1,017.25; 1 receiving and shipping clerk, at $1,000	2,017.25		
Navy-yard, Washington, D. C.: In general storehouse: 1 bookkeeper, at $1,200; 1 clerk, at $1,200; 1 receiving clerk, at $1,000; 1 bill clerk, at $1,000; 1 shipping clerk, at $1,000; 1 writer, in pay office, at $1,017.25	6,417.25		
Navy-yard, Brooklyn, N. Y.: In general storehouses: 3 bookkeepers, at $1,200 per annum, $3,600; 1 assistant bookkeeper, at $1,000; 1 assistant bookkeeper, at $720; 3 receiving clerks, at $4 per diem, $3,756; 1 assistant receiving clerk, at $1,099; 3 shipping clerks, at $1,000 per annum, $3,000; 1 bill clerk at $1,000; 1 assistant bill clerk, at $720; 2 leading men, at $2.50 per diem, $1,565; 5 pressmen, at $2.75 per diem, $4,319.40; 1 superintendent of coffee mill, at $3 per diem, $939; 1 box maker, at $3 per diem, $939; 1 engine tender, at $3.28 per diem, $1,020.38; 1 coffee roaster, at $2.50 per diem, $782.50; 1 fireman, at $2 per diem, $626; 1 messenger, at $2.25 per diem, $704.25. In pay office: 1 writer, at $1,017.25; 1 messenger, at $2.25 per diem, $704.25. In office of board of inspection: 1 writer, at $900 per annum.	28,412.03		
In general storehouse: 1 clerk, at $1,000 (submitted); 1 clerk, at $720 (submitted)	1,720.00		
Navy-yard, Norfolk, Va.: In general storehouses: 2 bookkeepers, at $1,200 per annum, $2,400; 2 assistant bookkeepers, at $1,017.25, $2,034.50; 1 bill clerk, at $1,000; 1 assistant bill clerk, at $720; 1 receiving clerk, at $942; 1 assistant receiving clerk, at $720. In pay office: 1 writer, at $1,017.25	8,833.75		
Navy-yard, Mare Island, Cal.: In general storehouses: 2 bookkeepers, at $1,200 per annum, $2,400; 2 assistant bookkeepers, at $720 per annum, $1,440; 1 receiving clerk, at $1,000; 1 shipping clerk, at $1,000; 1 bill clerk, at $1,000; 1 assistant bill clerk, at $1,000. In pay office: 1 writer, at $1,017.25	8,857.25		
Navy-yard, Norfolk, Va.: In general storehouse: 1 clerk, at $1,000 per annum (submitted); 1 clerk, at $720 per annum (submitted)	1,720.00		
Navy-yard, Mare Island, Cal.: In general storehouse: 1 clerk, at $1,000 per annum (submitted); 1 clerk, at $720 per annum (submitted)	1,720.00		
Total amount		$72,692.03	$67,581.09

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REPORT

OF THE

CHIEF OF BUREAU OF MEDICINE AND SURGERY.

NAVY DEPARTMENT,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., October 7, 1891.

SIR: I have the honor to submit the statistical report of the health of the Navy for the year 1890, together with estimates for the fiscal year ending June 30, 1893, the condition of the naval hospital fund, and the naval medical establishments.

NAVAL HOSPITALS, SANATORIUM, SICK QUARTERS, AND NAVY-YARDS.

Widows Island, Penobscot Bay, Maine.—This hospital, intended for the reception of sick from ships infected with yellow fever, has thus far been exempt from such admissions. It is kept in readiness and a contract for supplies, when needed, is made each year. Its condition remains good, and only a few minor repairs have been required, and those due to its exposed situation, namely, shutters for all the basement windows; storm strips applied to other windows; pointing of dead, well, and boat houses; pipe laid to carry off surface water from deck of well house. This work was done by the keeper and one laborer. One man and team was employed for hauling gravel to repair roads and walks, and a cedar planked rowboat was purchased.

Portsmouth, N. H., navy-yard.—No repairs or improvements have been made at the sick quarters, as the naval hospital was under construction. Plans and specifications for the construction of the naval hospital buildings were prepared by Mr. William M. Poindexter, architect, Washington, D. C. After due advertisement the contract was awarded to the lowest bidder. Messrs J. & J. Philbrook of Portland, Me., for the sum of $38,967. The contract was dated September 5, 1890, and all the work of said contract having been performed under the superintendence of Civil Engineers Prindle and McCollom, it was accepted from September 16, 1891. The Bureau expresses its entire approval of the satisfactory manner in which the contract was executed. The hospital is in charge of the surgeon of the navy-yard, and its equipment will soon be completed. The grounds have been enlarged by the addition of an acre, making a total of about 3½ acres.

Chelsea, Mass.—The good condition of this hospital has continued. Among the various repairs and improvements were those to roof of hospital, replacement of slate; new water supply to barn; new floor in coal

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shed; general repairs to doors, windows, and shutters; all water-closet tanks relined with tinned copper; bells, wire, and attachments repaired or replaced; repairs to arches of furnaces and smoke stack. The general sewer system has been overhauled, broken pipes replaced, blind drains fixed and free flowing insured; stable partly rebuilt with many improvements. At the smallpox annex floor timbers and posts of porch have been replaced, tanks relined, and plumbing repaired. A wire ribbon fence has been placed along a portion of the rear of grounds. At the house of the medical director the repairs are limited to defective soil pipes and main water supply.

The Supervising Surgeon-General of the Marine-Hospital Service made a request to the Secretary of the Treasury, and the latter to the Secretary of the Navy, that a portion of the naval reservation connected with the naval hospital at Chelsea be set aside for the purpose of constructing a roadway into the marine-hospital grounds adjoining. The present entrance to the marine-hospital is on High street, and necessitates a long and arduous climb before admission can be obtained to the grounds. The difficulty would be avoided by the construction of a roadway from Broadway through a portion of the naval reservation, which is unused. Upon reference the Bureau stated that the parcel of land desired was not in use nor would be required in the future for naval hospital purposes, and therefore recommended that it be transferred to the Treasury Department for the purpose of constructing the aforesaid roadway and entrance. The transfer has been made.

Boston, Mass., navy-yard.—The recommendation made in former reports to permanently close the offensive privy vault used by the prison guard and workmen, near the prison entrance, has been adopted. In proximity a new privy with approved sanitary arrangements has been substituted and connection made with the sewer. The result is highly satisfactory.

Attention is again called to the condition of the dispensary, its situation, dampness, want of sufficient light, and noise of thoroughfare. It is recommended that a building be erected expressly for its purpose in nearness to the workshops in the center of the yard where most of the accidents happen that require surgical aid, provided with rooms suitably equipped for their reception and properly fitted for the first treatment of the sick and injured from the yard and marines from the barracks.

Brooklyn, N. Y.—The situation and capacity of this hospital require that it be kept prepared for every demand that may be made upon its resources. It has been thoroughly repaired and its improvements are many.

A contract was made, after due advertisement, with Alexander McKnight for the laundry building for the sum of $2,800, and with the A. M. Dolph Company for its machinery and fittings for the sum of $2,120. The work has been satisfactorily completed in accordance with the specifications of the Bureau and under the supervision of Civil Engineer Asserson.

Owing to a fire in November at the steam building, by which the roof was destroyed, a uniform corrugated iron roof has been constructed over the old and new buildings. The laundry is equipped with a modern plant of two brass hydraulic washing machines, a centrifugal wringer, six soapstone washtubs, two cedar bluing tubs, a steam drying closet of ten racks, ironing stove, ironing tables, etc. It has a wainscot of glazed tiles and a handsome finish. Part of the space for the new laundry, in

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the west end of the steam building, was gained by removing the large revolving fan for ventilating the hospital with the then existing heating apparatus, an entirely new heating apparatus having been introduced last year with increased facilities for obtaining its fresh-air supply from outdoors instead of from the cellar.

The site of the old laundry has been converted into a large messroom for the full-diet mess, a smaller messroom for the special-diet mess, and an additional employé's room for the laundryman. The former special-diet messroom is now used as a kitchen for the officers' mess, and the former full-diet messroom adjoining has been converted into a linen room with direct communication with the new laundry; the former linen room has been fitted and furnished as a reception and dining room for officer patients, for whom no such conveniences have heretofore existed.

An important work has been the opening of the manholes and vents to the entire sewer system, these having been originally covered with flags on the surface level and become overgrown by sod until their locations were hidden. All are now built up above the ground and covered with perforated plates. The highest point of the sewer is now connected by a ventilating duct with the chimney of the steam building, and the several drains from the kitchen, etc., which empty into the sewer, are supplied with running traps opening above the surface and accessible for inspection and cleaning. The large cisterns under the basement, fouled from disuse, have been emptied, cleaned, and closed. A new water meter and water gates have been introduced inside the main entrance to the grounds and covered by a suitable structure, affording easy access.

On account of the accidental destruction by fire of an old wooden waste chute it has been replaced by one of iron for the safe discharge of rubbish from the several floors to the ground outside the building.

Other repairs and improvements have been: Repainting of all rooms on the second floor and some on the first floor; floors of four wards sheathed with narrow strips of pine; repairing and repainting the roof of hospital; a picket and Styron fence separating the vegetable garden from the coal shed and steam building; gas pipes and fixtures introduced in the contagious diseases annex, and the building painted without and within; post-mortem building fitted up and painted.

The professional facilities of the hospital have been increased by a dark room equipped with a Ray storage cabinet for electro-cautery and electro-motor purposes; an atomizing stand and other special apparatus for examinations and operations; an electric room furnished with a Ranney cabinet battery for any form of galvanic or faradic work; bath rooms for all required medicinal baths, alkaline, hot air, steam, mercurial, sulphur, or vapor.

Naval Laboratory.—During the year this establishment, under its accustomed excellent administration, has, in the efficiency of its general purveying and distributing service, met every requirement and maintained its reputation to meet any emergency.

The building used for storing lumber and box factory has been extended and repaired and a new hoisting apparatus put in the laboratory in place of the dangerous old one.

At the laboratory residence, repairs to plumbing, water closets, and water tanks, replacement of fallen ceilings, and same rooms repapered, and carpets renewed in part, comprise the repairs made.

Navy-yard.—Octagonal building, No. 34, is being fitted for the accommodation of the dispensary and analytical laboratory according to the

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plans of Civil Engineer Asserson. The upper story will contain the laboratory and three offices for a surgeon and assistant surgeons. The lower floor will contain the dispensary and a reception room for the injured and for operations. The building is well adapted for its purpose, being light, quiet, easy of access, and near the locality where accidents are likely to occur.

Analytical Laboratory.—Medical Inspector Kershner reports that at the analytical laboratory one hundred and thirty-one samples of supplies were examined, of which eighty-eight were accepted and forty-three were rejected.

Philadelphia, Pa., Naval Hospital.—The good condition of the hospital continues. The principal repairs and improvements have been to the steam engine, water cylinder, steam pump, and arch in furnace of boiler; to slate roof of engine and boiler house; one twelve horse-power engine and one auxiliary boiler provided; system in main kitchen range changed; hair mattresses and pillows repaired; wire screens supplied for one hundred and seventy-nine windows and twenty-two doorways; hot house thoroughly repaired, with extension of 10 feet made thereto.

Annapolis, Md., Naval Academy.—The sick quarters are in good condition.

The water closets for cadets are in a building detached from their quarters and are kept in order with difficulty. The recommendation made in former reports is renewed for the erection of a suitable structure containing a system of approved closets, traps, and ventilators, and the old building destroyed.

Washington, D. C.—The condition of the Naval Hospital continues satisfactory. During the year the following improvements and repairs have been made: Outside of building painted; new iron hot-water boiler, with wrought-iron stands for both boilers in kitchen; repairs to gas and water pipes and range; new water closets, urinals, iron tanks, bath tub and basin; discolored and broken plastering repaired, with pine ceiling; chimneys pointed with cement and two partly rebuilt; new shutters and caps to cupola; in attic dilapidated windows opening outwards, thereby causing much annoyance and expense by breakage by the winds and storms, replaced with new ones opening inwards; new flooring to several rooms; cement floor in laundry; two removable iron window-guard frames adjusted to the windows in one ward and a small room on basement floor, for the restraint of violent and insane patients.

Norfolk, Va.—The good condition of the Naval Hospital is maintained. The following repairs and improvements have been made: Abutment to foot bridge completed, covering surface with an artificial stone coping and pavement; curving and extending brick walk; repairing roof, cornices, gutters, and down spouts; repairing floors in certain wards and putting double floors in certain rooms; painting all doors, window frames, and blinds; ceiling and walls in main halls kalsomined; repairs to boiler, force pumps, and laundry engine; window awnings; repairs to wharf, driving piles, straightening up the decking, sheathing with plank, secured plank placed diagonally; taking down, resetting, and painting picket fence around hospital.

At the residence of the director: A new outbuilding for wood and coal; a Styron combination fence, with necessary posts and gates; painting fences and iron fencing on balconies; awnings for windows, door, and veranda.

Pensacola, Fla.—The wooden pavilion buildings erected on the grounds of the old Naval Hospital, near Fort Barrancas, continue to

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answer all requirements. The renovation made has been the removal of old gutters and the substitution of new ones, two coats of paint to the buildings, and repairs to the plastering where necessary.

A large, round, brick cistern has been built and fitted with necessary attachments, including force pump, hose, etc., for extinguishing fires. The attendants have improved the appearance of the grounds and kept the place in order.

Mare Island, Cal., Naval Hospital.—The hospital buildings and grounds are generally in good condition. The distribution of water for fire purposes and in the grounds has been materially changed and improved. Old and worn-out pipe was cut out and removed, and about 2,000 feet of new pipe laid, and fire and steam hose purchased. A No. 3 Davidson pump has replaced a worn-out pump in the west end of the building, and 150 feet of galvanized iron pipe laid between the cistern and this pump to replace worn-out suction pipe; foundation of main steam boiler repaired and wooden floor of laundry torn out and replaced by concrete and cement; a new kitchen range, with overhanging hood, has been substituted for the old range; general repairs and improvements to buildings. The cemetery has been put in good order and thirty head and foot boards made, lettered, and put in place.

An electric-light plant has been installed at the navy-yard, and an extension of this system to the hospital will require no additional boiler and dynamo power; only independent wires, transferrers, switch boards, etc., will be needed. As it is not expected that gas will be used except at the Marine Barracks and hospital, it is apprehended the service may not be satisfactory; hence the desirability of lighting with electricity, which the Bureau hopes to accomplish.

At the last session of Congress the sum of $15,500 was appropriated "for construction of a residence for the medical director in charge of naval hospital, Mare Island, California, in full of all expenses of erecting and making necessary improvements about the grounds." A suitable site has been selected near the entrance to the grounds, and plans and specifications comprising the views of the Bureau have been prepared by Civil Engineer Endicott, in the Bureau of Yards and Docks, and advertisement made for the construction of the building.

Yokohama, Japan.—The Naval Hospital has greatly improved in condition. The most important repairs and improvements are: Floors throughout main building covered with Oregon pine and shellacked; all ward bedsteads and tables repaired and painted; apothecary's quarters enlarged, and office, dispensary, and several rooms for the sick and employés repapered; all roofs and chimneys coal-tarred and repointed; front and side verandas of main building made new and, with other verandas, repainted; kitchen enlarged and refitted in part; additional bath room at surgeon's quarters. A disinfecting house was built, with a spacious oven, in which a temperature of 230° can be maintained, and a large pot for boiling introduced; a general library for the use of officers and patients; additional ornamentation made to the grounds.

The Brush system of electric lighting is now used in the hospital buildings, dating from April 17, 1891. Every necessary safeguard and convenience in the way of fuses, cut-outs, switches, etc., have been introduced. The inspector for the Yokohama fire offices reports as follows: "There are ninety-seven incandescent lamps installed, and Grimshaw white core wire is used throughout. The tests made speak well for the installation of the wire, and for the manner in which the

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wire has been laid." The installation was effected by the Union Light Company of Yokohama.

MUSEUM OF HYGIENE.

Medical Director Wales in his annual report states that "the Museum is becoming better known, and the practical character of the work done is challenging attention throughout the country."

The purification of water by rapid filtration is the most important subject that has been investigated, and will be made a matter of a special and exhaustive report.

In the chemical department analyses of various animal substances, normal as well as the result of pathological processes, have been made; also, of foods and drinks, medicines, ores, minerals, metals, woods, cements, and deposit in drainpipes.

Voluntary contributions of 1,796 books and pamphlets have been made to the library during the year.

Work has been done in the bacteriological and microscopical departments, and their condition is satisfactory. New exhibits to the number of 126 have been added to the exhibit department.

Recommendations are made for acquiring a portion of the grounds soon to be vacated by the Naval Observatory for the permanent establishment of the Museum, in view of the fact that at no very distant day the question of new and permanent quarters will demand consideration.

As difficulty has been encountered in securing the services of a competent chemist in consequence of the present inadequate compensation, it is recommended that said pay be increased to $1,500, or more. It is also recommended "that a permanent appropriation of $5,000 per annum be asked for the museum for the purchase of exhibits, books, apparatus, etc., and the support of a course of popular lectures from competent men on the various subjects pertaining to sanitary science, which is the custom of similar institutions abroad."

The recommendations are approved by the Bureau.

VACANCIES IN THE MEDICAL CORPS.

There are at present four vacancies in the medical corps. In August the vacancies were reduced to two, the lowest number attained during the past twenty-six years.

The Medical Board is now in session at the Naval Hospital, Brooklyn, N. Y., and it is confidently expected that the existing vacancies will be filled during the present session of the Board.

DELEGATES.

In December, 1890, Medical Director Bloodgood and Passed Assistant Surgeon Ames were appointed delegates to represent the medical department of the Navy at a meeting of the American Public Health Association, held at Charleston, S. C.

In December, 1890, by request of the State Department, Surgeon Bertolette was appointed the special commissioner, on behalf of the World's Columbian Exposition, to the Argentine Republic.

In May, 1891, Medical Director Beardsley and Surgeon Flint were appointed delegates to represent the medical department of the Navy at a meeting of the American Medical Association, held at Washington, D. C.

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In March, 1891, Passed Assistant Surgeons Rush and Ogden were detailed for duty in connection with the Intercontinental Railway Commission.

In June 1891, Medical Director Wales was appointed a delegate to represent the medical department of the Navy at the Seventh International Congress of Hygiene and Demography, held in London, England, in August 1891.

Special directions were given by the Bureau for Medical Director Wales, during his absence, to visit the museums of hygiene and bacteriological laboratories at London, Paris, and Berlin, and investigate the water supply of these cities; also, to avail himself of every opportunity for obtaining information concerning the latest improvements in the methods of bacteriological research and in water analyses, and to direct his attention to matters pertaining to hygiene that might be of value in the naval service, or would tend to the improvement of the Museum of Hygiene of which he was in charge.

YELLOW FEVER.

One case of yellow fever occurred on board the U. S. S. *Chicago*. Fleet Surgeon Walton reported—

That while the *Chicago* was in the harbor of Rio de Janeiro Lieut. Schuetze went ashore in the afternoon of June 24, and again the following afternoon. He rode in the street cars each day past an open drain, where workmen were overturning offensive soil, which was afterwards disinfected by the city authorities. Two to four deaths from yellow fever occurred daily during that week at Rio, and it is probable that Lieut. Schuetze contracted the disease while on shore at that port. He was placed on the list June 27, and was returned to duty entirely well July 20. The nature of the disease was not positively recognized until the appearance of albuminuria. The treatment pursued was sponging the body hourly with cold water and rum, and frequent doses of quinia and antipyrine were administered. After Lieut. Schuetze's recovery hygeinic precautions were adopted as far as practicable; the compartment in which he had been located was thoroughly fumigated, his room painted, and his bedding and other effects destroyed. No other cases of the disease occurred on board during the year.

CHOLERA.

One case of cholera occured during the year on board the U. S. S. *Omaha*. Medical Inspector Brush writes that the first case of cholera was reported at Yokohama, Japan, on the 14th day of July, from which time the disease increased from day to day in the city and vicinity until about the 1st of September, when it began to abate, although the disease continued active at many other points in the empire. The fact that the disease made less progress at Yokohama than in other cities of Japan is to be attributed to the superior quality of its water supply.

The origin of the single case that occurred on the *Omaha*, and which resulted fatally, was possibly due to some indiscretion of the man while engaged in necessary boat duty, although boats were supplied with water from the ship and their crews ordered to use no other.

SMALLPOX.

One case of smallpox occured during the year on the U. S. S. *Monocacy*, while at Kiu-Kiang, China, January 20, 1890. Passed Assistant Surgeon Norfleet, of the *Monocacy*, reports that the origin of the disease

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was probably due to exposure to morbific causes existing at the time at Kiu Kiang. The patient was last vaccinated in 1878. The following day after the patient was taken sick, and there could be no mistake in properly diagnosing the disease, he was transferred ashore to a small hospital in charge of some Catholic sisters of charity, where he remained until he returned well, February 16th. After the patient was taken ashore his room was emptied of all its effects, bureau removed and scrubbed inside and out, and also the drawers under the berth. Every part of the room was thoroughly scrubbed with hot water and soap, and afterwards mopped over with a solution of bichloride of mercury one to five hundred parts, and the door and port left open for thorough ventilation. The sanitary precautions prevented any further spread of the disease, and no other cases occured on board during the year.

MEASLES.

There were reported during the year twenty cases of measles, fifteen in the hospitals and on shore stations and five cases on the vessels afloat, all of which were treated successfully and the patients returned to duty.

INFLUENZA (LA GRIPPE).

This disease presents some very interesting facts in connection with the sick of the Navy for the year 1890. One thousand four hundred and twenty-two cases were reported, one-tenth of the whole number admitted to the sick list during the year, representing a loss to the service of 7,719 days, or an average of 5+ days for each case. The disease was not confined to any locality or to the force afloat, but prevailed alike on our vessels in foreign waters and at home, in the hospitals and at shore stations. It is more remarkable to note that only one death occurred out of 1,422 cases reported.

DENGUE.

Seventy-one cases of dengue were admitted to the sick list of the U. S. S. *Kearsarge*, during the month of December, while at Key West, Fla. The crew had been granted general liberty for forty-eight hours, and the origin of the disease was due, probably, to infection on shore, where there were a great number of cases at the time. The vessel came as far north as Norfolk, Va., arriving there December 31. The disease was soon controlled and treated successfully and no deaths occurred.

BERIBERI.

In the month of November the Brazilian cruiser *Guanabara* came into the port of New York and sent 5 cases of beriberi to the Naval Hospital in Brooklyn, where they were still under treatment at the close of the year.

PENSION CASES.

Number of pension cases remaining on hand, June 30, 1890	207
Number received during fiscal year ending June 30, 1891	1,830
Number answered during fiscal year ending June 30, 1891	2,033
Number remaining on hand June 30, 1891	4

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ENLISTMENTS.

The number of persons examined for the Navy, including apprentice boys, during the year 1890, was 9,834; of this number 3,620 were rejected for physical disqualifications. The number rejected for color blindness was 110, or a ratio of 11.18 in a thousand.

SICK OF THE NAVY.

The number of patients admitted to the sick list and under treatment during the year 1890 was 12,849; of this number 8,607 were on vessels afloat and receiving ships; 1,496 in hospitals, and 2,746 at navy-yards and shore stations.

The daily average number of sick on vessels afloat and receiving ships was 161.86. The average number of days each case was under treatment represented a total loss to the Government of 59,080 days, or 6.86 days for each man.

The number invalided to hospitals was 771, or 88.50 in a thousand.

MORTUARY RECORD.

The number of deaths in the entire Navy, during the year 1890, was 106, distributed as follows: In the hospitals, 49; at the navy-yards and shore stations, 19; and on vessels afloat and receiving ships, 38. The death rate for the entire available force of the service, including officers and men and Marine Corps, was 9+ in 1,000.

The death rate for the year 1888 was 12+, and for the year 1889, 18+ in 1,000. The excessive death rate for the year 1889 was occasioned by the disaster at Samoa.

The death rate of the vessels afloat and receiving ships for the year 1890 is lower than it has been for many years.

The service was remarkably exempt from contagious and infectious diseases. One case of yellow fever occurred on board the *Chicago* while at Rio de Janeiro, Brazil; 1 case of cholera on the *Omaha* while at Yokohama, Japan, and 1 case of small pox on the *Monocacy* while at Kiukiang, China.

INSANE OF THE NANY.

There were eighty-six patients belonging to the Navy treated in the Government Hospital for the Insane, in the District of Columbia, for the year ended September 30, 1891:

Remaining in hospital September 30, 1890		64
Admitted during the year ending September 30, 1891		22
Total under treatment		86
Discharged during the year:		
Recovered	4	
Improved	2	
Died	4	
		10
Remaining in hospital September 30, 1891:		
Officers	8	
Enlisted men	68	
Total		76

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NAVAL HOSPITAL FUND.

The condition of this fund is as follows, viz:

Balance on hand, October 1, 1890	$214,941.96
Transferred to the credit since October 1, 1890	99,378.88
Credit by appropriation, act March 2, 1891	20,000.00
	334,320.84
Expended since October 1, 1890	90,555.63
Balance on hand October 1, 1891	243,765.21

I submit tabular statements of sick, etc., compiled from reports of sick from the different naval stations within the United States, and from vessels on home and foreign stations, for the year 1890.

Very respectfully, your obedient servant,

JNO. MILLS BROWNE,
Surgeon-General, U. S. Navy.

Hon. B. F. TRACY,
Secretary of the Navy.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893 by the Bureau of Medicine and Surgery, Navy Department.

Detailed objects of expenditure. and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
SALARIES.			
Chief clerk (appropriated act of March 3, 1891)	$1,800.00		
One clerk of class 3 (same act)	1,600.00		
Two clerks of class 2 (same act)	2,800.00		
Two clerks of class 1 (same act)	2,400.00		
One clerk (same act)	1,000.00		
One assistant messenger (same act)	720.00		
One laborer (same act)	660.00		
One janitor for naval dispensary (same act)	600.00		
One laborer for naval dispensary (same act)	480.00	$12,060.00	$12,060.00
BINDING.			
Rebinding of medical journals of hospitals, ships, and stations, on file in the pension department of the Bureau of Medicine and Surgery (submitted)		1,500.00	
The above-mentioned appropriation is earnestly recommended for the necessary preservation of important records. Many of the journals can with difficulty be held together, the binding having been worn out by constant use for reference to journals in obtaining evidence in pension cases.			
MEDICAL DEPARTMENT.			
For surgeons' necessaries for vessels in commission, navy-yards, naval stations, Marine Corps, and Coast Survey, and for the civil establishment at the several naval hospitals, navy-yards, naval laboratory, museum of hygiene, and Naval Academy (appropriated, act of March 2, 1891)		60,000.00	60,000.00
NAVAL HOSPITAL FUND.			
For maintenance of the naval hospital at the various navy-yards and stations, and for care and maintenance of patients in other hospitals at home and abroad (same act)		20,000.00	20,000.00
CONTINGENT.			
For freight, expressage on medical stores, tolls, ferriages, transportation of sick and insane patients; care, transportation, and burial of the dead; advertising; telegraphing; rent of telephones; purchase of books and stationery; binding of unbound books and phamphlets; postage and purchase of stamps for foreign service; expenses attending the medical board of examiners; rent of rooms for naval dispensary and museum of hygiene; hygienic and sanitary investigation and illustration; sanitary and hygienic instruction; purchase and repairs of wagons and harness; purchase of and feed for horses and cows; trees, plants, garden tools and seeds; furniture and incidental articles for the museum of hygiene, naval dispensary, Washington naval laboratory, sick quarters at Naval Academy and Marine Barracks, surgeons' offices and dispensaries at navy-yards and naval stations; washing for medical department at museum of hygiene, naval dispensary Washington, naval laboratory, sick quarters at Naval Academy and Marine Barracks, dispensary at navy-yards, and naval stations, and ships, and rendezvous, and all other necessary contingent expenses (same act)		25,000.00	25,000.00
REPAIRS.			
For necessary repairs of naval laboratory, naval hospitals, and appendages, including roads, wharves, outhouses, sidewalks, fences, gardens, farms, and cemeteries (same act)		20,000.00	20,000.00

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Force afloat.—General aggregate, 1890.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service			
Morbid states and processes irrespective of parts affected	5	58	44	17			2	503
General diseases, dependent upon morbid poisons:								
Class 1	85	1,268	1,262	57	1	3	30	5,885
Class 2		502	471	25		2	4	2,589
Class 3	1	22	11	10			2	354
Class 4	10	407	311	96	5		5	4,952
Dependent upon causes other than morbid poisons:								
Class 1		42	41	1				137
Class 2	2	181	173	8		2		554
Developmental diseases		3		1			2	34
Unclassified diseases	7	527	454	71	2		7	3,942
Local diseases:								
Diseases of the nervous system	2	354	308	37	8	1	2	1,539
Diseases of the eye	1	101	86	15			1	378
Diseases of the ear	2	47	41	6	2			206
Diseases of the nose		7	5	2				21
Diseases of the circulatory system		41	25	14		1	1	303
Diseases of the respiratory system	12	860	699	136	2	7	28	6,095
Diseases of the digestive system	7	1,256	1,198	50	2	3	10	5,251
Diseases of the lymphatic system	6	171	122	50			5	2,816
Diseases of the urinary system	3	47	29	19	2			589
Diseases of the generative system	11	329	292	41			7	4,070
Diseases of the locomotor system	2	37	36	2			1	314
Diseases of the integumentary system	10	684	655	32			7	5,856
Parasitic diseases	1	8	9					25
Poisons		13	13					69
Tumors and cysts, malignant or nonmalignant		12	9	3				70
Surgical operations		1	1					8
Injuries, etc	21	1,440	1,331	78	5	19	28	11,889
Feigned diseases		1	1					1
Total	188	8,419	7,627	771	29	38	142	59,099

Force afloat.—Detailed statement 1890.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRREPECTIVE OF PARTS AFFECTED.								
Adynamia	4	54	41	15			2	460
Atropia		1		1				1
Hæmorrhagia		1	1					5
Œdema		1	1					21
Tuberculosis	1	1	1	1				16
GENERAL DISEASES DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus	79	856	884	28		1	22	3,400
Cholera epidemica		1				1		1
Denguis		71	69	2				443
Diarrhœa epidemica		1	1					5
Dysenteria acuta		13	9	3	1			97
Dysenteria chronica		3	2	1				27
Febricula		6	6					15
Febris corebro spinalis		1	1					2
Febris continua simplex	5	226	224	5			2	1,197

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Force afloat.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Continued to next year.	Total number of sick days.
GENERAL DISEASES DEPENDENT UPON MORBID POISONS—continued.								
Class 1—Continued.								
Febris enterica	.....	15	.....	9	.....	1	5	177
Febris ephemeralis	.....	1	1	.....	.....	.....	.....	2
Febris flava	.....	1	1	.....	.....	.....	.....	22
Febris typho-malarialis	.....	5	.....	5	.....	.....	.....	63
Morbilli	.....	5	2	3	.....	.....	.....	16
Parotitis	.....	2	2	.....	.....	.....	.....	24
Vaccina	1	57	57	.....	.....	.....	1	418
Variola	.....	1	1	.....	.....	.....	.....	35
Varicella	.....	3	2	1	.....	.....	.....	11
Class 2.								
Cachexia malarialis	.....	26	18	8	.....	.....	.....	194
Febris intermittens	.....	245	240	1	.....	.....	4	899
Febris remittens	.....	230	213	15	.....	2	.....	1,488
Malaria toxæmia	.....	1	.....	1	.....	.....	.....	
Class 3.								
Cellulitis	.....	1	1	.....	.....	.....	.....	4
Erysipelas	1	15	8	7	.....	.....	1	140
Phagedæna	.....	2	2	.....	.....	.....	.....	56
Septicæmia	.....	4	.....	3	.....	.....	1	154
Class 4.								
Gonorrhœa	7	166	157	14	.....	.....	2	2,112
Syphilis primitiva	2	70	49	22	.....	.....	1	927
Syphilis consecutiva	1	171	105	60	5	.....	2	1,913
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Asphyxia	.....	2	2	.....	.....	.....	.....	17
Caloris effectus	.....	30	30	.....	.....	.....	.....	79
Frigoris effectus	.....	10	9	1	.....	.....	.....	41
Class 2.								
Alcoholismus	2	181	173	8	.....	2	.....	554
DEVELOPMENTAL DISEASES.								
Senectus	.....	3	.....	1	.....	.....	2	24
UNCLASSIFIED DISEASES.								
Anæmia	.....	2	2	.....	.....	.....	.....	13
Asthenia	.....	1	1	.....	.....	.....	.....	8
Diabetes	.....	5	4	1	.....	.....	.....	40
Lumbago	.....	15	14	1	.....	.....	.....	78
Podagra	.....	15	13	1	.....	.....	1	114
Rheumatismus	4	387	329	55	2	.....	5	2,843
Rheumatismus acutus	3	100	89	13	.....	.....	1	835
Torticollis	.....	2	2	.....	.....	.....	.....	11
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	.....	2	.....	.....	.....	1	1	17
Cephalalgia	.....	72	69	3	.....	.....	.....	205
Chorea	.....	1	1	.....	.....	.....	.....	5
Convulsio	.....	5	3	1	1	.....	.....	19
Dementia	.....	8	2	5	1	.....	.....	60
Debilitas	.....	1	1	.....	.....	.....	.....	2
Epilepsia	.....	13	8	3	2	.....	.....	71
Hysteria	.....	1	.....	1	.....	.....	.....	14

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Force afloat.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
Diseases of the nervous system—Continued.								
Insolatio	.....	5	5	.....	.....	.....	.....	44
Insomnia	.....	9	8	1	.....	.....	.....	21
Mania	.....	5	1	3	1	.....	.....	32
Melancholia	.....	10	1	7	2	.....	.....	51
Meningitis	.....	1	.....	1	.....	.....	.....	2
Monomania	.....	1	1	.....	.....	.....	.....	3
Nausea	.....	1	1	.....	.....	.....	.....	1
Nausea marina	.....	69	67	2	.....	.....	.....	163
Neuralgia	.....	120	116	3	.....	.....	1	582
Neurasthenia	1	1	1	1	.....	.....	.....	11
Paralysis	1	9	4	5	1	.....	.....	158
Sciatica	.....	2	2	.....	.....	.....	.....	22
Vertigo	.....	18	17	1	.....	.....	.....	57
Diseases of the eye.								
Asthenopia	.....	2	1	1	.....	.....	.....	2
Cataracta	.....	1	.....	1	.....	.....	.....	1
Conjunctivitis	.....	68	58	10	.....	.....	.....	441
Dacrocystitis	.....	1	1	.....	.....	.....	.....	4
Hordeolum	.....	4	4	.....	.....	.....	.....	16
Iritis	.....	7	6	1	.....	.....	.....	80
Keratitis	.....	6	5	1	.....	.....	.....	230
Myopia	.....	3	3	.....	.....	.....	.....	12
Ophthalmia	1	1	2	.....	.....	.....	.....	22
Pterygium	.....	1	1	.....	.....	.....	.....	1
Trachoma	.....	1	1	.....	.....	.....	.....	11
Ulcus corneæ	.....	6	4	1	.....	.....	1	58
Diseases of the ear.								
Otalgia	.....	11	11	.....	.....	.....	.....	50
Otitis	.....	22	20	2	.....	.....	.....	131
Otorrhœa	2	10	7	3	2	.....	.....	70
Surditas	.....	4	3	1	.....	.....	.....	15
Diseases of the nose.								
Coryza	.....	1	1	.....	.....	.....	.....	4
Catarrhus nasalis	.....	3	3	.....	.....	.....	.....	8
Epistaxis	.....	2	1	1	.....	.....	.....	10
Ozæna	.....	1	.....	1	.....	.....	.....	9
Diseases of the circulatory system.								
Aneurysma	.....	2	1	.....	.....	1	.....	2
Dilatatio cordis	.....	2	2	.....	.....	.....	.....	61
Iritatio cordis	.....	1	.....	1	.....	.....	.....	11
Hypertrophia cordis	.....	1	.....	1	.....	.....	.....	1
Morbi valvularum cordis	.....	10	3	7	.....	.....	.....	40
Palpitatio	.....	20	14	5	.....	.....	1	139
Phlebitis	.....	1	1	.....	.....	.....	.....	37
Varix	.....	4	4	.....	.....	.....	.....	12
Diseases of the respiratory system.								
Aphonia	.....	1	1	.....	.....	.....	.....	4
Asthma	.....	9	5	3	.....	1	.....	37
Bronchitis acuta	3	313	270	33	.....	.....	13	2 497
Bronchitis chronica	.....	39	18	20	.....	.....	1	387
Catarrhus	1	302	284	8	.....	.....	11	1,011
Congestia pulmonalis	.....	1	1	.....	.....	.....	.....	3
Hæmoptysis	.....	12	7	5	.....	.....	.....	97
Laryngitis	.....	50	48	1	.....	.....	1	351
Phthisis pneumonica acuta	.....	6	1	5	.....	.....	.....	77
Phthisis pneumonica chronica	1	28	5	23	1	.....	.....	534
Pleuritis	3	40	32	10	1	.....	.....	361
Pneumonia	4	59	27	28	.....	6	2	769

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Force afloat.—Detailed statement 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Continued to next year.	Total number of sick days.
LOCAL DISEASES—continued.								
Diseases of the digestive system.								
Caries dentium	.....	2	2	.....	.....	.....	.....	3
Odontalgia	.....	10	10	.....	.....	.....	.....	30
Parulis	.....	1	1	.....	.....	.....	.....	7
Ascites	.....	1	.....	1	.....	.....	.....	79
Cholera morbus	.....	65	63	.....	.....	2	.....	160
Cholitithiasis	.....	1	1	.....	.....	.....	.....	17
Colica	.....	107	103	3	.....	.....	1	313
Colica hepatica	.....	1	1	.....	.....	.....	.....	4
Constipatio	.....	46	46	.....	.....	.....	.....	116
Congestio hepatis	.....	16	13	3	.....	.....	.....	119
Duodenitis	.....	1	1	.....	.....	.....	.....	2
Dyspepsia	.....	33	30	2	1	.....	.....	235
Diarrhœa acuta	1	347	342	4	.....	.....	2	1,094
Diarrhœa chronica	.....	6	5	1	.....	.....	.....	21
Enteritis	.....	7	6	.....	.....	1	.....	36
Fistula in ano	.....	13	7	6	.....	.....	.....	205
Gastritis	.....	18	15	3	.....	.....	.....	44
Gastrodynia	.....	4	3	1	.....	.....	.....	27
Glossites phlegmenosa	.....	1	1	.....	.....	.....	.....	6
Hæmatemesis	.....	4	4	.....	.....	.....	.....	27
Hæmorrhoids	.....	52	44	8	.....	.....	.....	317
Hepatitis acuta	.....	5	3	1	1	.....	.....	71
Hepatitis chronica	1	1	2	.....	.....	.....	.....	26
Icterus	.....	17	13	4	.....	.....	.....	167
Obstructio intestinalis	.....	1	1	.....	.....	.....	.....	7
Œsophagitis	.....	1	1	.....	.....	.....	.....	6
Peritonitis	.....	1	1	.....	.....	.....	.....	19
Pharyngitis	.....	71	69	2	.....	.....	.....	223
Prolapsus ani	.....	1	.....	1	.....	.....	.....	2
Stomatitis	.....	4	3	1	.....	.....	.....	23
Tonsillitis	4	412	403	6	.....	.....	7	1,791
Typhlitis	1	6	4	3	.....	.....	.....	154
Diseases of the lymphatic system.								
Adenitis	6	169	120	50	.....	.....	5	2,802
Lymphangitis	.....	2	2	.....	.....	.....	.....	14
Diseases of the urinary system.								
Albuminuria	1	6	2	4	1	.....	.....	113
Asthenia	.....	1	1	.....	.....	.....	.....	1
Brights disease	.....	1	1	.....	.....	.....	.....	1
Colica renalis	.....	1	1	.....	.....	.....	.....	5
Calculus	2	1	2	1	.....	.....	.....	46
Cystitis	.....	25	15	9	1	.....	.....	285
Dysuria	.....	1	1	.....	.....	.....	.....	8
Enuresis	.....	3	2	1	.....	.....	.....	5
Hæmaturia	.....	5	2	3	.....	.....	.....	90
Ischuria	.....	1	1	.....	.....	.....	.....	3
Nephritis	.....	2	1	1	.....	.....	.....	23
Diseases of the generative system.								
Abscessus perinei	.....	1	.....	1	.....	.....	.....	16
Balanitis	.....	8	7	1	.....	.....	.....	59
Chancroides	6	110	103	13	.....	.....	.....	1,915
Epididymitis	.....	8	7	.....	.....	.....	1	93
Fistula in perineo	.....	2	2	.....	.....	.....	.....	51
Hydrocele	.....	2	2	.....	.....	.....	.....	78
Mastitis	.....	1	1	.....	.....	.....	.....	4
Orchitis	5	136	125	10	.....	.....	6	1,459
Paraphymosis	.....	3	3	.....	.....	.....	.....	13
Phymosis	.....	10	10	.....	.....	.....	.....	87
Prostatitis	.....	1	1	.....	.....	.....	.....	35
Urethræ strictura	.....	39	24	15	.....	.....	.....	232
Urethritis	.....	3	3	.....	.....	.....	.....	26
Varicocele	.....	5	4	1	.....	.....	.....	22

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Force afloat.—Detailed statement 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Continued to next year.	Total number of sick days.
LOCAL DISEASES—continued.								
Diseases of the locomotor system.								
Ankylosis	.....	2	1	.....	.....	.....	1	22
Arthritis	.....	2	2	.....	.....	.....	.....	13
Bursitis	.....	3	3	.....	.....	.....	.....	15
Caries	.....	1	1	.....	.....	.....	.....	14
Ostitis	.....	1	1	.....	.....	.....	.....	1
Periostitis	.....	2	2	.....	.....	.....	.....	15
Synovitis	2	25	25	2	.....	.....	.....	231
Talipes	.....	1	1	.....	.....	.....	.....	3
Diseases of the integumentary system								
Abscessus	2	232	224	7	.....	.....	3	1,554
Anthrax	.....	12	10	2	.....	.....	.....	203
Bromidrosis	.....	2	2	.....	.....	.....	.....	57
Cellutitis	.....	2	2	.....	.....	.....	.....	9
Clavus	.....	1	1	.....	.....	.....	.....	5
Condylomata	.....	1	.....	1	.....	.....	.....	1
Dermatitis verenata	.....	1	1	.....	.....	.....	.....	4
Ecthyma	.....	2	1	1	.....	.....	.....	5
Eczema	.....	29	25	3	.....	.....	1	360
Erythema	.....	4	4	.....	.....	.....	.....	28
Furunculus	2	218	217	2	.....	.....	1	1,220
Herpes	.....	7	7	.....	.....	.....	.....	57
Lichen	.....	2	2	.....	.....	.....	.....	27
Myoma	.....	1	.....	1	.....	.....	.....	6
Onychia	.....	10	10	.....	.....	.....	.....	61
Paronychia	3	25	27	.....	.....	.....	1	287
Pemphigus	.....	2	2	.....	.....	.....	.....	8
Pernio	1	1	2	.....	.....	.....	.....	8
Phthiriasis pubi	.....	1	1	.....	.....	.....	.....	2
Prurigo	.....	3	3	.....	.....	.....	.....	31
Purpura hæmorrhagia	.....	1	.....	1	.....	.....	.....	1
Scabies	.....	5	4	1	.....	.....	.....	62
Sycosis	.....	2	1	1	.....	.....	.....	4
Taenia solium	.....	3	2	1	.....	.....	.....	11
Ulcus	2	105	95	11	.....	.....	1	1,764
Unguis, involutus	.....	5	5	.....	.....	.....	.....	38
Urticaria	.....	4	4	.....	.....	.....	.....	16
Verruca	.....	3	3	.....	.....	.....	.....	28
PARASITIC DISEASES.								
Vermes	1	8	9	.....	.....	.....	.....	25
POISONS.								
Ebriositas	.....	1	1	.....	.....	.....	.....	1
Vulnus venenatum	.....	11	11	.....	.....	.....	.....	58
Venenum	.....	1	1	.....	.....	.....	.....	1
TUMORS AND CYSTS.								
Malignant or Nonmalignant.								
Adenoma	.....	1	1	.....	.....	.....	.....	2
Cystis	.....	6	5	1	.....	.....	.....	17
Epithelioma	.....	1	1	.....	.....	.....	.....	9
Fibroma	.....	2	1	1	.....	.....	.....	31
Lipoma	.....	1	1	.....	.....	.....	.....	5
Osteoma	.....	1	.....	1	.....	.....	.....	6
SURGICAL OPERATIONS.								
Circumcissio	.....	1	1	.....	.....	.....	.....	8
INJURIES, ETC.								
Abrasio	3	80	80	1	.....	.....	2	444
Ambustio	1	79	74	4	.....	.....	2	791
Concussio	.....	31	28	2	.....	.....	1	278
Contusio	2	322	311	8	1	.....	4	1,931
Explosio	.....	2	1	.....	.....	1	.....	7
Fractura	4	88	52	2	2	3	2	2,064
Hernia	1	87	21	33	2	.....	2	261

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Force afloat.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Continued to next year.	Total number of sick days.
INJURIES, ETC.—continued.								
Homicide	.....	1	.....	13	.....	1	.....	1
Internal injuries	.....	1	.....	.....	.....	1	.....	1
Luxatio	.....	13	11	.....	.....	.....	.....	156
Rupture	.....	2	1	1	.....	.....	.....	9
Stremma	3	337	329	6	.....	.....	5	2,123
Submersio	.....	10	2	.....	.....	8	.....	13
Vulnus contusum	1	120	115	2	.....	.....	4	872
Vulnus incisum	2	129	124	3	.....	.....	4	1,078
Vulnus laceratum	4	127	128	2	.....	.....	1	1,312
Vulnus punctum	.....	49	48	.....	.....	1	.....	263
Vulnus sclopetarium	.....	11	5	1	.....	4	1	283
Vulnus venenatum	.....	1	1	.....	.....	.....	.....	2
FEIGNED DISEASES.								
Neuralgia	.....	1	1	.....	.....	.....	.....	1
Total	188	8,419	7,627	771	29	38	142	59,060

Navy-Yards and Stations.—General aggregate, 1890.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided. To hospital.	Invalided. From service.	Died.	Remaining at the end of the year.	Total number of sick days.
Morbid states and processes irrespective of parts affected	2	72	68	5	0	1	0	626
General diseases—dependent upon morbid poisons:								
Class 1	32	493	491	32	0	1	1	3,066
Class 2	7	118	112	11	0	0	2	773
Class 3	1	4	1	4	.....	.....	.....	18
Class 4	3	77	31	47	1	.....	1	495
Dependent upon causes other than morbid poisons:								
Class 1	.....	1	1	.....	.....	.....	.....	3
Class 2	1	45	41	4	.....	1	.....	126
Developmental diseases	.....	1	.....	1	.....	.....	.....	1
Unclassified diseases	4	139	117	21	1	.....	4	1,288
Local diseases:								
Diseases of the nervous system	4	172	144	21	3	2	6	1,024
Diseases of the eye	1	43	40	3	.....	.....	1	325
Diseases of the ear	1	26	24	2	.....	.....	1	238
Diseases of the nose	.....	3	3	.....	.....	.....	.....	8
Diseases of the circulatory system	.....	24	12	4	1	4	3	170
Diseases of the respiratory system	18	381	359	23	.....	6	11	3,050
Diseases of the digestive system	5	558	529	24	.....	.....	10	2,445
Diseases of the lymphatic system	1	17	10	8	.....	.....	.....	213
Diseases of the urinary system	3	23	17	6	.....	2	1	579
Diseases of the generative system	1	37	20	17	.....	.....	1	363
Diseases of the locomotor system	.....	8	5	2	1	.....	.....	55
Diseases of the integumentary system	2	116	111	4	.....	1	2	896
Poisons	.....	1	1	.....	.....	.....	.....	10
Tumors and cysts—malignant or nonmalignant	.....	2	1	1	.....	.....	.....	25
Surgical operations	.....	2	.....	.....	.....	.....	.....	32
Injuries, etc	11	286	262	28	3	1	3	2,288
Total	97	2,649	2,402	268	10	19	47	18,063

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Navy-yards and stations.—Detailed statement, 1890.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia	2	71	68	4	.....	1	.....	625
Hydrops	.....	1	.....	1	.....	.....	.....	1
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus	27	404	414	17	.....	.....	.....	2,488
Dysenteria acuta	1	7	7	1	.....	.....	.....	21
Febris continua simplex	4	50	46	7	.....	1	.....	230
Febris enterica	.....	5	2	3	.....	.....	.....	110
Morbilli	.....	7	3	4	.....	.....	.....	92
Parotitis	.....	1	1	.....	.....	.....	.....	10
Vaccina	.....	19	18	.....	.....	.....	1	115
Class 2.								
Cachexia malarialis	2	6	8	.....	.....	.....	.....	30
Febris intermittens	5	101	96	9	.....	.....	1	556
Febris remittens	.....	8	5	2	.....	.....	1	179
Febricula	.....	3	3	.....	.....	.....	.....	8
Class 3.								
Erysipelas	1	4	1	4	.....	.....	.....	18
Class 4.								
Gonorrhœa	3	62	27	38	.....	.....	.....	405
Syphilis primitiva	.....	8	2	5	1	.....	.....	66
Syphilis consecutiva	.....	7	2	4	.....	.....	1	24
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus	.....	1	1	.....	.....	.....	.....	3
Class 2.								
Alcoholismus	1	44	40	4	.....	1	.....	123
Narcotism	.....	1	1	.....	.....	.....	.....	5
DEVELOPMENTAL DISEASES.								
Senectus	.....	1	.....	1	.....	.....	.....	1
UNCLASSIFIED DISEASES.								
Anæmia	.....	1	1	.....	.....	.....	.....	8
Diabetes	.....	2	2	.....	.....	.....	.....	30
Lumbago	.....	2	2	.....	.....	.....	.....	10
Podagra	1	3	4	.....	.....	.....	.....	43
Rheumatismus	2	110	93	15	1	.....	3	917
Rheumatismus acutus	1	21	15	6	.....	.....	1	280
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	.....	2	1	.....	.....	1	.....	45
Cephalalgia	2	65	63	1	.....	.....	3	181
Convulsio	.....	3	1	2	.....	.....	.....	4
Congestio spinalis	.....	1	1	.....	.....	.....	.....	58
Dementia	.....	6	.....	5	1	.....	.....	42
Epilepsia	.....	7	2	3	2	.....	.....	43
Insomnia	.....	1	1	.....	.....	.....	.....	15
Locomotor ataxia	.....	2	1	1	.....	.....	.....	34
Mania	.....	1	.....	1	.....	.....	.....	1
Melancholia	.....	2	1	.....	.....	.....	1	2

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Navy-yards and stations.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
Diseases of the nervous system—Continued.								
Neuralgia	1	51	50	.....	.....	.....	2	241
Neurasthenia	.....	6	6	.....	.....	.....	.....	84
Paralysis	1	8	2	6	.....	1	.....	187
Sciatica	.....	1	1	.....	.....	.....	.....	12
Vertigo	.....	16	14	2	.....	.....	.....	75
Diseases of the eye.								
Astigmatism	.....	1	1	.....	.....	.....	.....	1
Amaurosis	.....	1	.....	1	.....	.....	.....	1
Asthenopia	.....	4	4	.....	.....	.....	.....	54
Atrophy of optic nerve	.....	1	.....	.....	.....	.....	1	80
Blepharitis	.....	4	4	.....	.....	.....	.....	17
Cataracta	.....	1	1	.....	.....	.....	.....	1
Conjunctivitis	.....	23	21	2	.....	.....	.....	124
Diplopia	1	.....	1	.....	.....	.....	.....	9
Hordeolum	.....	4	4	.....	.....	.....	.....	12
Iritis	.....	1	1	.....	.....	.....	.....	9
Keratitis	.....	2	2	.....	.....	.....	.....	15
Ophthalmia	.....	1	1	.....	.....	.....	.....	2
Diseases of the ear.								
Otalgia	.....	7	7	.....	.....	.....	.....	19
Otitis	1	12	12	1	.....	.....	.....	155
Otorrhœa	.....	5	5	.....	.....	.....	.....	45
Surditas	.....	2	.....	1	.....	.....	1	19
Diseases of the nose.								
Catarrhus nasalis	.....	3	3	.....	.....	.....	.....	8
Diseases of the circulatory system.								
Dilatatio cordis	.....	1	.....	.....	.....	1	.....	1
Hypertrophia cordis	.....	1	.....	.....	1	.....	.....	21
Morbi valvularum cordis	.....	8	4	2	.....	2	.....	66
Myocarditis ch	.....	1	.....	.....	.....	1	.....	1
Palpitatio	.....	12	7	2	.....	.....	3	79
Varix	.....	1	1	.....	.....	.....	.....	2
Diseases of the respiratory system.								
Asthma	.....	5	5	.....	.....	.....	.....	22
Bronchitis acuta	7	71	65	7	.....	1	5	661
Bronchitis chronica	.....	17	13	4	.....	.....	.....	167
Catarrhus	6	250	251	2	.....	.....	3	1,225
Emphysema	.....	1	1	.....	.....	.....	.....	10
Hæmoptysis	1	5	4	2	.....	.....	.....	35
Laryngitis	.....	6	4	1	.....	.....	1	58
Phthisis pneumonica acuta	.....	1	1	.....	.....	.....	.....	21
Phthisis pneumonica chronica	2	11	4	3	.....	4	2	689
Pleuritis	1	5	4	2	.....	.....	.....	25
Pleurodynia	.....	2	2	.....	.....	.....	.....	8
Pneumonia	1	7	5	2	.....	1	.....	129
Diseases of the digestive system.								
Odontalgia	.....	6	6	.....	.....	.....	.....	16
Cholera morbus	.....	11	11	.....	.....	.....	.....	49
Colica	.....	44	43	1	.....	.....	.....	114
Constipatio	.....	32	30	.....	.....	.....	2	82
Congestio hepatis	.....	5	5	.....	.....	.....	.....	46
Dyspepsia	1	41	40	1	.....	.....	1	337
Diarrhœa acuta	2	240	234	2	.....	.....	6	799
Fistula in ano	1	2	2	1	.....	.....	.....	13
Gastritis	1	9	7	3	.....	.....	.....	224
Hæmorrhois	.....	8	6	2	.....	.....	.....	43
Hepatitis acuta	.....	2	2	.....	.....	.....	.....	25
Icterus	.....	4	2	2	.....	.....	.....	25
Peritonitis	.....	1	.....	1	.....	.....	.....	1

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Navy-yards and stations.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
Diseases of the digestive system—Continued.								
Pharyngitis	.....	47	47	.....	.....	.....	.....	194
Prolapsus ani	.....	1	1	.....	.....	.....	.....	16
Stomatitis	.....	1	1	.....	.....	.....	.....	6
Tonsillitis	.....	104	92	11	.....	.....	1	455
Diseases of the lymphatic system.								
Adentitis	1	17	10	8	.....	.....	.....	213
Diseases of the urinary system.								
Albuminuria	1	6	3	1	.....	2	1	281
Calculus	.....	1	1	.....	.....	.....	.....	6
Colica renal	.....	1	1	.....	.....	.....	.....	4
Cystitis	2	4	5	1	.....	.....	.....	207
Diabetes mellitus	.....	1	1	.....	.....	.....	.....	1
Dysuria	.....	1	1	.....	.....	.....	.....	23
Enuresis	.....	4	2	2	.....	.....	.....	12
Hæmaturia	.....	1	.....	1	.....	.....	.....	1
Nephritis	.....	4	3	1	.....	.....	.....	44
Diseases of the generative system.								
Balanitis	.....	2	2	.....	.....	.....	.....	11
Chancroides	.....	18	8	9	.....	.....	1	172
Orchitis	.....	13	8	5	.....	.....	.....	114
Urethræ stricture	.....	4	1	3	.....	.....	.....	42
Varicocele	1	.....	1	.....	.....	.....	.....	24
Diseases of the locomotor system.								
Ankylosis	.....	2	1	.....	1	.....	.....	23
Cellutitis	.....	1	1	.....	.....	.....	.....	1
Ostitis	.....	1	1	.....	.....	.....	.....	13
Synovitis	.....	4	2	2	.....	.....	.....	18
Diseases of the integumentary system.								
Abscessus	.....	32	30	.....	.....	1	1	247
Anthrax	1	3	4	.....	.....	.....	.....	51
Clavus	.....	2	2	.....	.....	.....	.....	53
Dermatitis	.....	1	.....	1	.....	.....	.....	1
Eczema	1	6	6	1	.....	.....	.....	151
Erythema	.....	5	5	.....	.....	.....	.....	22
Furunculus	.....	41	39	1	.....	.....	1	183
Herpes	.....	2	2	.....	.....	.....	.....	25
Paronychia	.....	4	4	.....	.....	.....	.....	16
Scabies	.....	1	1	.....	.....	.....	.....	14
Ulcus	.....	12	11	1	.....	.....	.....	96
Unguis involutus	.....	5	5	.....	.....	.....	.....	21
Urticaria	.....	2	2	.....	.....	.....	.....	7
POISONS.								
Vulnus venenatum	.....	1	1	.....	.....	.....	.....	10
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Cystis	.....	1	1	.....	.....	.....	.....	24
Ranula	.....	1	.....	1	.....	.....	.....	1
SURGICAL OPERATIONS.								
Circumcision	.....	2	2	.....	.....	.....	.....	22
INJURIES, ETC.								
Abrasio	.....	17	17	.....	.....	.....	.....	34
Ambustio	1	2	2	1	.....	.....	.....	18
Contusio	1	57	58	.....	.....	.....	.....	226

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Navy-yards and stations.—Detailed statements, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
INJURIES, ETC.—continued.								
Fractura	2	14	7	9	.....	.....	.....	150
Hernia	1	13	7	5	2	.....	.....	143
Luxatio	.....	9	8	1	.....	.....	.....	180
Stremma	4	88	86	3	1	.....	2	707
Vulnus contusum	.....	37	34	2	.....	.....	1	251
Vulnus incisum	.....	14	13	.....	.....	1	.....	133
Vulnus laceratum	1	20	17	4	.....	.....	.....	125
Vulnus punctum	1	10	11	.....	.....	.....	.....	111
Vulnus sclopetarium	.....	5	2	3	.....	.....	.....	36
Total	97	2,649	2,402	268	10	19	47	18,083

Naval hospitals.—General aggregate, 1890.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected	2	19	14	1	5	.....	1	1,698
General diseases—dependent upon morbid poisons:								
Class 1	10	107	104	.....	.....	1	12	4,227
Class 2	2	47	41	1	.....	.....	7	1,515
Class 3	1	10	7	.....	.....	.....	4	334
Class 4	23	164	140	1	4	.....	42	9,313
Dependent upon causes other than morbid poisons:								
Class 1	1	1	2	.....	.....	.....	.....	131
Class 2	2	52	50	.....	.....	3	1	550
Developmental diseases	1	2	3	.....	.....	.....	.....	311
Unclassified diseases	18	114	91	2	8	1	30	7,676
Local diseases:								
Diseases of the nervous system	21	95	49	17	24	7	19	6,229
Diseases of the eye	5	21	15	2	3	.....	6	2,031
Diseases of the ear	.....	9	5	1	1	.....	2	660
Diseases of the nose	.....	3	2	.....	1	.....	.....	115
Diseases of the circulatory system	8	32	16	2	11	6	5	2,327
Diseases of the respiratory system	28	191	128	8	25	23	35	11,882
Diseases of the digestive system	12	103	91	2	3	1	18	4,885
Diseases of the lymphatic system	10	54	50	.....	.....	.....	14	4,207
Diseases of the urinary system	4	28	18	.....	5	3	6	1,852
Diseases of the generative system	12	67	64	.....	1	.....	14	3,752
Diseases of the locomotor system	3	5	6	.....	1	1	.....	279
Diseases of the integumentary system	13	45	43	.....	3	.....	12	2,612
Parasitic diseases	.....	2	2	.....	.....	.....	.....	105
Tumors and cysts, malignant or nonmalignant	.....	12	7	.....	.....	2	3	452
Surgical operations	1	.....	.....	.....	1	.....	.....	128
Injuries, etc	25	111	87	5	25	1	18	8,780
Total	202	1,294	1,035	42	121	49	249	76,051

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Naval hospitals.—Detailed statement, 1890.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia	1	18	13	1	4	.....	1	1,591
Atrophia	.....	1	.....	.....	1	.....	.....	69
Hydrops	1	.....	1	.....	.....	.....	.....	28
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus	6	50	55	.....	.....	.....	1	1,831
Denguis	.....	2	.....	.....	.....	.....	2	2
Diphtheria	1	.....	1	.....	.....	.....	.....	104
Dysenteria acuta	.....	8	7	.....	.....	.....	1	137
Dysenteria chronica	.....	1	.....	.....	.....	.....	1	3
Febris continua simplex	.....	11	11	.....	.....	.....	.....	316
Febris enterica	3	21	19	.....	.....	.....	5	1,418
Febris typho-malarialis	.....	5	2	.....	.....	1	2	178
Morbilli	.....	8	8	.....	.....	.....	.....	223
Varicella	.....	1	1	.....	.....	.....	.....	15
Class 2.								
Cachexia malarialis	.....	7	6	.....	.....	.....	1	203
Febris intermittens	.....	16	15	.....	.....	.....	1	406
Febris remittens	2	24	20	1	.....	.....	5	906
Class 3.								
Erysipelas	1	10	7	.....	.....	.....	4	334
Class 4.								
Gonorrhœa	5	58	51	.....	2	.....	10	2,148
Syphilis primitiva	7	23	25	.....	.....	.....	5	1,504
Syphilis consecutiva	11	83	64	1	2	.....	27	5,661
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus	1	1	2	.....	.....	.....	.....	131
Class 2.								
Alcoholismus	2	51	50	.....	.....	2	1	500
Purpura hemorrhagia	.....	1	.....	.....	.....	1	.....	50
DEVELOPMENTAL DISEASES.								
Senectus	1	2	3	.....	.....	.....	.....	311
UNCLASSIFIED DISEASES.								
Anæmia	1	3	3	.....	.....	.....	1	155
Beri-beri	.....	5	.....	.....	.....	.....	5	158
Diabetes	.....	1	1	.....	.....	.....	.....	28
Lumbago	.....	3	3	.....	.....	.....	.....	31
Podagra	.....	1	1	.....	.....	.....	.....	50
Rheumatismus	14	87	71	2	7	1	20	6,463
Rheumatismus acutus	3	14	12	.....	1	.....	4	791
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia	.....	4	1	.....	.....	3	.....	36
Cephalalgia	.....	7	2	.....	1	.....	4	433
Convulsio	2	4	2	1	3	.....	.....	187
Dementia	3	12	5	7	1	.....	2	1,283
Epilepsia	3	8	5	.....	4	.....	2	253
Hysteria	.....	2	2	.....	.....	.....	.....	126

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Naval hospitals.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
Diseases of the nervous system—Continued.								
Insanity	.....	1	.....	1	.....	.....	.....	17
Irritatio spinalis	.....	1	1	.....	.....	.....	.....	5
Locomotor ataxia	1	3	.....	1	1	.....	2	608
Mania	.....	3	1	2	.....	.....	.....	63
Melancholia	3	7	5	2	2	1	.....	574
Meningitis	.....	1	.....	.....	.....	1	.....	1
Morphinomania	.....	1	1	.....	.....	.....	.....	133
Myelitis	.....	1	1	.....	.....	.....	.....	62
Nausea marina	.....	1	.....	.....	1	.....	.....	34
Neuralgia	4	5	4	1	2	.....	2	553
Neurasthenia	1	7	5	1	2	.....	.....	244
Neuritis	.....	1	1	.....	.....	.....	.....	15
Pachymeningitis	1	.....	1	.....	.....	.....	.....	97
Paralysis	2	18	6	.....	5	2	7	1,018
Paresis	.....	1	.....	1	.....	.....	.....	77
Rachialgia	1	.....	.....	.....	1	.....	.....	171
Vertigo	.....	7	6	.....	1	.....	.....	231
Diseases of the eye.								
Amaurosis	2	2	3	.....	.....	.....	1	421
Asthenopia	.....	1	1	.....	.....	.....	.....	97
Cataracta	1	2	.....	.....	2	.....	1	359
Conjunctivitis	.....	12	8	1	.....	.....	3	869
Iritis	1	1	1	1	.....	.....	.....	213
Keratitis	.....	1	.....	.....	1	.....	.....	12
Trachoma	1	.....	1	.....	.....	.....	.....	19
Ulcus corneæ	.....	2	1	.....	.....	.....	1	41
Diseases of the ear.								
Otalgia	.....	1	1	.....	.....	.....	.....	5
Otitis	.....	4	2	1	.....	.....	1	346
Otorrhœa	.....	2	1	.....	.....	.....	1	119
Surditas	.....	2	1	.....	1	.....	.....	190
Diseases of the nose.								
Catarrhus nasalis	.....	1	1	.....	.....	.....	.....	23
Epistaxis	.....	1	1	.....	.....	.....	.....	41
Ozæna	.....	1	.....	.....	1	.....	.....	51
Diseases of the circulatory system.								
Aneurysma	.....	1	.....	.....	.....	1	.....	8
Dilatatio cordis	.....	1	1	.....	.....	.....	.....	12
Hydrops pericardii	.....	1	1	.....	.....	.....	.....	60
Hypertrophia cordis	2	2	3	.....	1	.....	.....	352
Morbi valvularum cordis	4	16	5	2	7	5	1	1,047
Palpitatio	1	6	2	.....	2	.....	3	541
Phlebitis	.....	4	3	.....	1	.....	.....	151
Varix	1	1	1	.....	.....	.....	1	156
Diseases of the respiratory system.								
Asthma	.....	5	4	.....	.....	.....	1	172
Bronchitis acuta	1	32	20	.....	2	.....	2	1,191
Bronchitis chronica	6	29	21	3	4	.....	7	2,170
Catarrhus	.....	6	5	.....	.....	.....	1	116
Emphysema	.....	1	.....	.....	.....	.....	1	265
Hæmoptysis	1	4	3	.....	.....	.....	2	245
Laryngitis	1	2	2	.....	.....	.....	1	16
Phthisis pneumonica acuta	1	5	1	.....	3	1	1	336
Phthisis pneumonica chronica	8	45	18	4	13	9	9	4,045
Pleuritis	.....	18	10	1	1	3	3	1,142
Pneumonia	10	44	35	.....	2	10	7	2,184
Diseases of the digestive system.								
Alveolitis	.....	1	1	.....	.....	.....	.....	21
Cholera morbus	.....	6	6	.....	.....	.....	.....	46
Colica	.....	5	3	.....	.....	.....	2	25

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Naval hospitals.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
Diseases of the digestive system—Continued.								
Constipatio	1	1	2					17
Congestio hepatis		3			2		1	215
Cirrhosis hepatis	2	4	3				3	467
Dyspepsia	1	10	9		1		1	515
Diarrhœa acuta		7	7					102
Diarrhœa chronica	2	2	3				1	387
Fistula in ano		9	7				2	650
Gastritis		6	3			1	2	182
Gastrodynia		1	1					106
Hæmatemesis		1	1					65
Hæmorrhois	3	18	18				3	988
Hepatitis chronica		1	1					53
Icterus		5	2	1			2	215
Pharyngitis	1	2	3					66
Prolapsus ani		1	1					91
Stomatitis		1	1					13
Tonsillitis	2	16	17				1	486
Typhlitis		3	2	1				195
Diseases of the lymphatic system.								
Adenitis	10	54	50				14	4,207
Diseases of the urinary system.								
Albuminuria	1	4	3		1		1	343
Calculus		1			1			84
Cystitis	2	10	8		1		3	770
Enuresis	1	3	3		1			169
Hæmaturia		4	2		1		1	281
Nephritis		5	2			2	1	203
Urinæ retentis		1				1		2
Diseases of the generative system.								
Balanitis		1					1	63
Chancroides	2	24	20				6	1,229
Fistula, urethral	1		1					104
Hydrocele		2	1				1	73
Orchitis	5	17	22					846
Phymosis		2	1				1	55
Urethræ strictura	4	20	19				5	1,066
Varicocele		1			1			196
Diseases of the locomotor system.								
Arthritis	1		1					23
Synovitis	2	5	5		1	1		256
Diseases of the integumentary system.								
Abscessus	4	12	11		1		4	503
Acne		1	1					10
Anthrax		2	2					81
Dermatitis medic		1	1					8
Ecthyma		1					1	16
Eczema	2	6	6				2	409
Furunculus		2	2					52
Herpes		1	1					19
Psoriasis	1		1					34
Rupia		1					1	44
Scabies	1	2	3					101
Sycosis		2	1				1	177
Tinea		1					1	22
Ulcus	5	13	14		2		2	1,057
PARASITIC DISEASES.								
Vermes		2	2					105

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Naval Hospitals.—Detailed statement, 1890—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
TUMORS AND CYSTS—MALIGNANT OR NON-MALIGNANT.								
Carcinoma recti	.....	4	.....	.....	.....	1	.....	1
Carcinoma	.....	1	1	.....	.....	.....	.....	101
Condyloma	.....	1	.....	.....	.....	.....	1	2
Cystis	.....	2	1	.....	.....	.....	1	97
Chondroma	.....	1	1	.....	.....	.....	.....	127
Epithelioma	.....	2	.....	.....	.....	1	1	43
Fibroma	.....	3	3	.....	.....	.....	.....	36
Myoma	.....	1	1	.....	.....	.....	.....	45
SURGICAL OPERATIONS.								
Amputatio	1	.....	.....	.....	1	.....	.....	128
INJURIES, ETC.								
Ambustio	.....	7	5	1	.....	.....	1	222
Concussio	.....	2	1	.....	.....	1	.....	9
Contusio	3	6	8	.....	.....	.....	1	498
Fractura	7	42	32	2	5	.....	10	3,435
Hernia	6	18	9	1	13	.....	1	1,832
Luxatio	1	4	4	.....	.....	.....	1	376
Rupture palm long	.....	1	1	.....	.....	.....	.....	40
Stremma	3	11	9	.....	2	.....	3	946
Vulnus contusum	2	4	6	.....	.....	.....	.....	112
Vulnus incisum	1	7	3	1	3	.....	1	344
Vulnus laceratum	.....	5	5	.....	.....	.....	.....	339
Vulnus sclopetarium	2	4	4	.....	2	.....	.....	627
Total	202	1,294	1,035	42	121	49	249	76,051

Report of enlistment for the year 1890.

Number of persons examined for the year 1890	9,834
Number accepted	6,214
Number rejected	3,620
Number color-blind	110
Number rejected per thousand	368.11
Number color-blind per thousand	11.18

Report of vaccination.

	Successful.	Unsuccessful.
No evidence of previous vaccination	196	554
Presenting good cicatrices	880	2,371
Evidence of former attack of smallpox	48	97

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Ratio per thousand of admissions for each class of disease of the force afloat.

Classification of diseases.	Ratio.	Classification of diseases.	Ratio.
Morbid states and processes, irrespective of parts affected	6.96	Local diseases:	
General diseases:		Diseases of the circulatory system	4.53
Dependent upon morbid poisons:		Diseases of the respiratory system	96.47
Class 1	138.62	Diseases of the digestive system	139.72
Class 2	55.33	Diseases of the lymphatic system	19.58
Class 3	2.54	Diseases of the urinary system	5.53
Class 4	46.13	Diseases of the generative system	37.61
Dependent upon causes other than morbid poisons:		Diseases of the locomotor system	4.31
Class 1	4.64	Diseases of the integumentary system	76.77
Class 2	20.24	Parasitic diseases	.99
Developmental diseases	33	Poisons	1.43
Unclassified diseases	59.07	Tumors and cysts—malignant or nonmalignant	1.32
Local diseases:		Surgical operations	.11
Diseases of the nervous system	39.38	Injuries, etc	161.63
Diseases of the eye	11.28	Feigned diseases	.11
Diseases of the ear	5.42		
Diseases of the nose	.77	Total	951.10

SUMMARY.—FORCE AFLOAT.

Daily average number of sick	161.86
Average number of days each case was under treatment	6.86
Admissions per thousand of mean strength	951.10
Invaliding per thousand of mean strength	88.50
Deaths per thousand of mean strength	4.20

General statistics.

Mean strength of the Navy and Marine Corps, including officers and men, for the year 1890:	
Officers of the Navy and Marine Corps on the active list	1,658
Enlisted men of the Navy	8,070
Enlisted men of the Marine Corps	2,040
Total	11,768
Mean strength of the force afloat, including officers and men	9,039
Total number of cases under treatment during the year 1890:	
Naval hospitals	1,496
Navy-yards and stations	2,746
Vessels afloat and receiving ships	9,607
Total	13,849
Total number of deaths from all causes during the year 1890:	
Naval hospitals	49
Navy-yards and stations	19
Vessels afloat and receiving ships	38
Total	106
Ratio per thousand of deaths in the navy for the year 1890	9.09

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Mortuary record of the Navy for the year 1890.

Causes of death.	Number of deaths.			Total.
	Hospitals.	Yards and stations.	Vessels.	
Alcoholismus	2	1	2	5
Apoplexia	3	1	1	5
Aneurysma	1	.....	1	2
Adynamia	.....	1	.....	1
Albuminuria	.....	2	.....	2
Abscessus	.....	1	.....	1
Asthma	.....	.....	1	1
Bronchitis, acute	.....	1	.....	1
Concussio	1	.....	.....	1
Catarrhus epidimicus	.....	.....	1	1
Cholera epidemicus	.....	.....	1	1
Cholera morbus	.....	.....	2	2
Carcinoma recti	1	.....	.....	1
Dilatatis cordis	.....	1	.....	1
Epithelioma	1	.....	.....	1
Enteritis	.....	.....	1	1
Explosio	.....	.....	1	1
Febris remittens	.....	.....	2	2
Febris enterica	.....	.....	1	1
Febris continua simplex	.....	1	.....	1
Febris typho-malarialis	1	.....	.....	1
Fractura	.....	.....	3	3
Gastritis	1	.....	.....	1
Homicide	.....	.....	1	1
Internal injuries	.....	.....	1	1
Melancholia	1	.....	.....	1
Meningitis	1	.....	.....	1
Morbi val. cordis	5	2	.....	7
Myocarditis, chronic	.....	1	.....	1
Nephritis	2	.....	.....	2
Purpura hemorrhagia	1	.....	.....	1
Paralysis	2	1	.....	3
Phthisis pneumonia, acute	1	.....	.....	1
Phthisis pneumonia, chronic	9	4	.....	13
Pneumonia	10	1	6	17
Pleuritis	3	.....	.....	3
Rheumatismus	1	.....	.....	1
Synovitis	1	.....	.....	1
Submersio	.....	.....	8	8
Urinae retentis	1	.....	.....	1
Vulnus incisum	.....	1	.....	1
Vulnus punctum	.....	.....	1	1
Vulnus sclopetarium	.....	.....	4	4
Total	49	19	38	106

Ratio per thousand of deaths in the Navy for the year 1890—9.00.

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CONTRACTS.

Proposals for supplies to the Naval Laboratory, Brooklyn, N. Y., July 22, 1890.

Bidders.	Class I, surgical instruments.	Class II, dispensary furniture.
Rowland A. Robbins	$82.64	$1,023.26
Lister Manufacturing Company		

The contracts for both classes were awarded to Rowland A. Robbins. The bid of the Lister Manufacturing Company was informal, the guaranty not being filled out and signed. The bid was not considered.

Proposals for building sick quarters at Portsmouth, N. H., September 1, 1890.

Bidders.	Amount.
Francis H. Smith	$43,000
J. & J. Philbrook	38,987
J. E. Giddings & Son	41,970
W. H. Glover & Co	41,940

The contract was awarded to J. & J. Philbrook.

Proposals for engine and boiler at Naval Hospital, Philadelphia, Pa., September 22, 1890.

Bidders.	Amount.
Henry J. Snell	$840
H. M. Sciple & Co	738
Daniel Kelly	1,300

Contract was awarded to H. M. Sciple & Co.

Proposals for supplies to Naval Laboratory, Brooklyn, N. Y., September 23, 1890.

Bidders.	Class I, hardware.	Class II, lumber.
J. W. Duryea		$530.50
Lewis H. Ross		364.04

Contract for Class II was awarded to Lewis H. Ross.
No proposals were received to furnish Class I.

Proposals to furnish hardware to the Naval Laboratory, Brooklyn, N. Y., October 7, 1890.

Bidders.	Amount.
A. F. Brombacher & Co	$896.33
Rowland A. Robbins	1,022.06
A. W. Paine	757.40

The contract was awarded to A. W. Paine.

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Proposals for laundry building at Naval Hospital, Brooklyn, N. Y., November 5, 1890.

Bidders.	Building.	Tiling.	Total.
E. S. Boyd	$2,825	$425	$3,250
Alex. McKnight	2,625	400	3,025

The contract was awarded to Alex. McKnight.

Proposals to furnish laundry machinery at Naval Hospital, Brooklyn, N. Y., November 24, 1890.

Bidders.	Amount.
Thomas J. Laing*	$2,047.00
Hospital Supply Company*	2,270.00
Laundry Machinery and Supply Company, Rochester, N. Y.	2,395.00
Wilson Laundry Machinery Company	2,259.96
A. M. Dolph Company	2,120.00
Troy Laundry Company	2,242.32
Empire Laundry Machinery Company	2,439.00

* Bids informal.

The contract was awarded to A. M. Dolph Company.

Proposals to build new roof to boiler house and laundry at Naval Hospital, Brooklyn, N. Y., December 27, 1890.

Bidders.	Amount.
Alexander McKnight	$5,995
P. J. Carlin & Co	4,900

The contract was awarded to P. J. Carlin & Co.

Proposals to supply dispensary furniture and bedding at naval laboratory, Brooklyn, N. Y., February 6, 1891.

Bidders.	Class I, dispensary furniture.	Class II, bedding.
W. F. Bernstein	.....	$681.75
Roller & Shoemaker	$2,046.39	.....
R. A. Robbins	1,945.04	851.50
Andrews, Gulick & Silcocks	2,195.95	.....
J. A. & C. H. Baldwin*	.....	713.50
Wechsler & Abraham	.....	724.25

*Bid informal.

Contract for Class I was awarded to Rowland A. Robbins.
Contract for Class II was awarded to W. F. Bernstein.

Proposals for supplying bottles to naval laboratory, Brooklyn, N. Y., March 2, 1891.

Bidders.	Amount.
Henry Allen	$1,635.50
Hagerty Bros. & Co	1,307.40
Roller & Shoemaker	1,496.02

The contract was awarded to Hagerty Bros. & Co.

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Proposals for annual supplies to Naval Hospital, Mare Island, California, May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter, cheese, and eggs.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.	Class VII, dispensary-yard provender.
James McCudden	*$1,772.18					$340.00		
Joseph Boss							$2,583.00	$390.00
Wilson & Bruce		$1,784.80	$1,108.50					280.00
Aden Brothers †				$180.00				
Henry Connolly		1,689.42	806.25		$60.00		1,686.15	260.00
James Brownlie						300.00		
James Smith								
D. W. Harrier & Sons	2,305.20	2,203.43	1,057.50	240.00	100.00	500.00	2,181.50	330.00
Brown & Flemming						325.00		
Samuel Brown	1,816.40							

*James McCudden was debarred by order of the Secretary of Navy, May 27, 1891.
†The bid of Aden Brothers was informal.

Class I was awarded to Samuel Brown. Classes II, III, V, and VII were awarded to James Brownlie. Class IV was awarded to Henry Connolly. Class VI was awarded to James Smith.

Proposals for annual supplies to Naval Hospital, Portsmouth, N. H., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
Clarence M. Prince	$731.30	$537.67	$423.00			$280.00	
James E. Chase		542.49	405.00			230.00	
Herman R. Paul	752.20				$95.00	280.00	
D. C. Norton & Co	1,081.40	568.98	389.00		100.00	235.00	

Classes I and II were awarded to Clarence M. Prince. Class III was awarded to D. C. Norton & Co. Class V was awarded to Herman R. Paul. Class VI was awarded to James E. Chase.

Proposals for annual supplies to Naval Hospital, Chelsea, Mass., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter and eggs.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
C. A. Simonds	$2,578.50	$2,491.95	$750.00	$300.00	$600.00	$600.00	$406.25
Balch & Mansfield	2,673.40	2,574.26	810.00	330.00	700.00	650.00	420.50
M. J. Doran & Co	2,716.90	2,580.80	794.00	315.00	650.00	650.00	432.60
A. J. Bacon & Co	2,760.50	2,524.94	802.00	330.00	675.00	625.00	542.15
Boston Ice Company				225.00			
J. E. Lewis & Co							336.15

Classes I, II, III, V, VI were awarded to C. A. Simonds. Class IV was awarded to Boston Ice Company. Class VII was awarded to J. E. Lewis & Co.

Proposals for annual supplies to Naval Hospital and laboratory, Brooklyn, N. Y., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.	Class VIII, laboratory provender.
Patrick Morrison	$5,736.00							
Austin T. Fitch				$750.00				
Andrew Koch		$3,508.84	$3,712.00				$450.60	$547.10
W. H. Belford	6,638.00	3,797.79	3,518.00	675.00	$2,400.00	$1,812.50	497.20	565.55
Wm. Wright					2,325.00			
Peter H. Miller						1,875.00		

Class I was awarded to Patrick Morrison. Classes II and VII were awarded to Andrew Koch. Classes III, IV, and VI were awarded to W. H. Belford. Class V was awarded to William Wright.

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Proposals for annual supplies to Naval Hospital, Philadelphia, Pa., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter and eggs.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
Robert McKeown	.....	$1,353.33	$961.00	$360.00	$735.00	$455.00	.....
Samuel Sproul	.....	1,347.55	891.20	.....	.....	.....	.....
Jno. T. Strickland	$3,066.80	.....	1,041.20	360.00	770.00	.....	.....
L. Shuster Boraef	2,911.50	.....	.....	.....	.....	.....	.....
Michael Dougherty	.....	.....	.....	.....	735.00	.....	.....
Jas. M. Snyder	.....	1,401.00	966.45	.....	.....	499.20	.....
David Mann	3,281.90	.....	.....	.....	.....	.....	.....

Class I was awarded to M. Shuster Boraef. Classes II and III were awarded to Samuel Sproul. Class IV was awarded to Jno. T. Strickland. Classes V and VI were awarded to Robert McKeown.

Proposals for annual supplies to Naval Hospital, Washington, D. C., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter and eggs.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
Edward Costell	$836.00	.....	.....	.....	.....	.....	.....
Browning & Middleton	.....	$683.18	$349.50	$90.00	$150.00	$197.50	.....

Class I was awarded to Edward Costell. Classes II, III, IV, V, VI were awarded to Browning & Middleton.

Proposals for annual supplies to Naval Hospital, Norfolk, Va., May 26, 1891.

Bidders.	Class I, meat.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
O. L. Williams	.....	.....	$1,510.00	.....	.....	.....	$414.00
Jno. A. Codd	$1,659.10	.....	1,701.00	.....	600.00	.....	.....
J. T. Barker & Bro	.....	$1,504.60	1,335.00	.....	600.00	$478.80	258.20
W. G. Maupin	.....	.....	.....	$470.00	.....	.....	.....
E. L. Woodward	1,802.60	.....	.....	.....	.....	.....	.....
V. J. Naw	.....	.....	.....	.....	.....	450.00	.....
C. R. Robertson	1,912.60	.....	.....	.....	420.00	.....	.....
Thomas J. Barlow	.....	1,436.70	1,440.00	.....	.....	.....	.....
Charles R. Nash	.....	.....	.....	460.00	.....	.....	.....
J. H. Cood & Bro	1,905,00	.....	1,705.00	.....	.....	.....	.....
Kate C. Brady	.....	.....	.....	.....	330.00	.....	.....

Class I was awarded to Jno. A. Codd. Class II was awarded to Thos. J. Barlow. Class III was awarded to J. T. Parker. Class IV was awarded to Chas. R. Nash. Class V was awarded to Kate C. Brady. Class VI was awarded to V. J. Naw. Class VII was awarded to J. T. Barker & Bro.

Proposals for annual supplies to Naval Hospital, Pensacola, Fla., May 26, 1891.

Bidders.	Class I, meat.	Class II, provisions.	Class III, butter, cheese, and eggs.	Class IV. ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
B. A. Philibert	$159.75	$412.56	$98.00	$187.50	$75.00	$50.00	$200.00
Fred Bauer	133.50	388.08	90.40	.....	75.00	50.00	174.00
Benj. Dolphin	114.30	334.08	81.30	148.50	47.50	50.00	160.00
M. Mooney	122.20	338.47	83.00	150.00	50.00	60.00	174.00

Classes I, II, III, IV, V, VI, and VII were all awarded to Benjamin Dolphin.

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REPORT

OF THE

COMMANDANT OF UNITED STATES MARINE CORPS.

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., October 18, 1891.

SIR: I have the honor to submit my annual report of the condition of the U. S. Marine Corps, a general synopsis of its service during the past year, and such recommendations as, in my judgment, the circumstances demand, in order that the corps which I have the honor to command may be able to meet the increased duties and responsibilities that have devolved upon it, owing to the rapid and important changes that have taken place in the Navy, of which this corps forms a considerable part.

I have made a personal inspection of all the different posts, except Mare Island, Cal., and the guards stationed at Sitka, Alaska, and the naval station Port Royal, S. C., and found them in excellent condition, and rendering as effective service as their diminished numbers would allow.

The increased demand for sea service has rendered it necessary to so reduce the number of men on shore as to make it impossible to furnish sufficient men for guard duty at the different navy-yards without a severe strain upon the enlisted men; in fact this strain has been so great as to cause considerable dissatisfaction and discontent in the ranks, and has resulted in the corps losing many of its old soldiers, and to deter others from joining it. It is not an unusual occurrence for the enlisted men to be forty-eight hours on guard consecutively, with but twenty-four hours off, thus allowing them only one night in three to "sleep in." At no army post in this country is such severe guard duty performed.

These facts lead me to earnestly urge an increase of 25 sergeants, 25 corporals, and 350 privates in the number of men to be appropriated for at the next session of Congress.

Frequent calls have been made during the past year upon these headquarters for marines to serve on board different ships of war, which it has been impossible to comply with; the many letters on file from commanding officers of ships urging an increase of the strength of the guards, the establishment of a post at Port Royal, S. C., and the numerous letters commending the services of the marines, adds another and a strong argument why an increase of men is desirable.

No additional legislation is required to accomplish this end save the necessary appropriation, as the strength of the corps is, by law, 3,000 enlisted men.

If it is contemplated by the Government that the Marine Corps shall keep pace with the gradual rise of the Navy (and from the nature of its

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duties one may be considered the necessary consequence of the other), immediate steps should be taken to make applicable to it certain means which, by practical experiments, have proven very beneficial when applied to the Army and Navy. In this connection your particular attention is called to an act of Congress, entitled "An act to prevent desertions from the Army, and for other purposes," approved June 16, 1890. The question as to whether this act did or did not apply to the Marine Corps was submitted to the Department from these headquarters in July, 1890, and by the Department referred to the Attorney-General for an opinion thereon. In his reply thereto, dated July 31, 1890, he held "that the only section of said act that applied to the Marine Corps was section 1, and mentions the fact that the military establishments of the United States consists of three principal organizations, the Army, the Navy, and the Marine Corps. Each has an organization distinct from that of the others, as plainly appears in the Revised Statutes, and each is the object of a distinct annual appropriation by Congress."

Section 1 of said act is of a penal character when viewed by itself, but when considered in connection with sections 2, 3 and 4 of the same act loses this nature, and the application of the four sections to the Army has proved very beneficial in many directions, principally in reducing the number of desertions. I therefore respectfully request that the attention of Congress may be called to this state of the case, and that the necessary legislation may be had to apply the entire act to the Marine Corps.

The Marine Corps is to-day the only regular military organization in the United States whose officers are not required to be examined, mentally and physically, before being promoted. The act of Congress approved October 1, 1890, entitled "An act to provide for examination of certain officers of the Army, and to regulate promotion therein," met a long-felt want in the Army, and if sections 1 and 3 of said act were made applicable, by legislation, to the Marine Corps, it would, in my judgment, necessitate increased diligence and application on the part of the officers, resulting in their being better equipped, mentally and professionally, for all official duties that may devolve upon them. I therefore urgently solicit your aid in accomplishing this end.

I am constrained to recommend that in any legislation that may be had for the corps, that appropriations be made for twelve quartermaster-sergeants, being one for each post, and one each at the offices of the quartermaster at headquarters and the assistant quartermaster at Philadelphia, Pa. The small increase of pay these sergeants would receive, and the holding out to them, as a reward for faithful service, of positions of this character, would prove a great incentive for men to remain in the service. At all army posts a quartermaster or commissary sergeant is deemed necessary, and at posts in the Marine Corps their services would be of as much importance. Few opportunities exist in the corps whereby the honest and faithful services of the old non-commissioned officers can be rewarded, and in view of the fact that at the different posts the commanding officers are called upon to perform the duties properly coming under the charge of a quartermaster or commissary sergeant, it seems very proper that some means should be afforded whereby they can be relieved from this class of duties.

While the marines are very useful in protecting Government property at our different navy-yards, still it is as artillerymen aboard our new floating batteries that their importance must be felt and acknowledged in the future. From all the ships of war where the marines are allowed

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to man the secondary or main batteries come very gratifying reports as to their adaptability for this service; and, in order that still greater efficiency may be secured, a school of application has been established at the Marine Barracks, Washington, D. C. (with the Department's approval), from which most excellent results must ensue.

It is believed that the course of instruction, as laid out in General Order No. 1, Headquarters U. S. Marine Corps, dated May 1, 1891 (a copy of which is herewith appended), is sufficiently broad to meet all present requirements; and that the noncommissioned officers and privates who take this course, will, in all essentials, be the peers of any of the enlisted men in the service, and will thus be able, both as artillerists and infantrymen, to fill a want seriously felt in the Navy.

Congress having recognized the desirability of an improvement in the corps in this respect, and having specially appropriated a sum of money sufficient to procure guns (Hotchkiss and Gatling) for the purpose of instruction in artillery work, has thus given its stamp of approval to a more extensive field of operation for the Marine Corps.

As the marines are now only stationed at the secondary battery by the courtesy of the captain of the ship, and in many cases are not allowed to man the battery as gun's crews, whereas the ship would be more efficient if the members of the guard were stationed at the secondary guns, I respectfully request that an order be issued requiring the marines to man the secondary battery.

At several posts, particularly at Mare Island, Cal., Boston, Mass., navy-yard, Washington, D. C., League Island, Pa., excellent facilities exist for long-range target practice, and reports received therefrom show a very creditable improvement in the marksmanship of the men. At other posts gallery practice is carried on with zeal and earnestness.

At the time of the trouble with the colored laborers on Navassa Island the marines of the U. S. S. *Kearsarge*, under command of Lieut. George T. Bates, U. S. Marine Corps, were landed to protect American lives and property, where they remained about three weeks, rendering most efficient service. For this service, Lieut. Bates and his men were highly commended in a letter from Commander Horace Elmer, U. S. Navy, commanding the *Kearsarge*.

By direction of the Navy Department, Capt. H. C. Cochrane, Lieuts. J. A. Turner and J. H. Pendleton, and forty enlisted men are now serving aboard the chartered steamer *Al-Ki*, in Bering Sea, upon special service.

By direction of the Department, a guard, consisting of one sergeant, two corporals, and ten privates, has recently been detailed for duty at the naval station, Port Royal, S. C., to protect the Government's interests against any outbreak that might occur there during the construction of the dry dock by contract, where a large number of laborers, many of them very vicious characters from the cities in the vicinity, are employed. These men have been quartered in tents since their arrival at the station, no provision having been made to house them, but in the first part of October a heavy northeast gale set in with rain; this was succeeded by a cold dry northeaster, which caused sickness in camp, and the doctor recommended that the men should be properly housed, whereupon the commandant of the station transferred the men to a large room known as the "Barracks," in the coal shed, temporarily. In view of the condition of the men at Port Royal, I respectfully urge that a temporary wooden structure, not to cost over $400, be built.

The marines have rendered most efficient service since their arrival

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at Port Royal, as shown by the following extract from a report made to the Chief of the Bureau of Yards and Docks by the commandant:

* * * * * * *

The services of the guard have been most valuable in maintaining order, preserving peace, and producing a moral effect upon the large force employed by the contractor.

It is therefore desirable that every precaution should be taken to preserve the health of the marine guard.

* * * * * * *

An increase of this force, with an officer to command it, has been asked for by the commandant of the station, and I respectfully recommend that his request may be complied with.

It therefore becomes necessary to ask Congress for an appropriation sufficient to erect a suitable temporary barracks for their accommodation, and I have directed the quartermaster to include in the estimates for the support of the corps, fiscal year 1892–'93, the sum of $3000 to meet the demand.

At the time of the capture of Valparaiso, Chile, by the Congressional party, and the ensuing excitement, the marines of the South Pacific station, under command of Capt. W. S. Muse, U. S. Marine Corps, were landed to protect the American consulate. They were on shore August 28, 29, and 30, 1891, and performed this duty in such an efficient and trustworthy manner as to merit the expressed approval of the commander-in-chief of the station.

At the naval training station at Newport, R. I., the guard of the U. S. S. *Richmond*, consisting of thirty-nine men, has been quartered on shore in tents for a year, but the tents are now worn out and it is impossible for the men to live in them longer with any degree of comfort. Under these circumstances the Department has loaned a building for a temporary barracks, which, with a small outlay for repairs, will make the men more comfortable and contented for the present.

If it is the intention of the Department to make a permanent shore station at Coaster's Harbor Island a suitable barracks should be estimated for.

In order that the corps may be properly represented at the World's Columbian Exposition, I have directed the quartermaster to ask for $1,000 in his estimates to defray the necessary expenses, and Capt. R. S. Collum, assistant quartermaster U. S. Marine Corps, has been detailed to prepare a suitable exhibit in the event of the appropriation being made.

The classification of the members of the Band U. S. Marine Corps was changed by the Department in November, 1888, increasing the members in the first and second classes, and reducing those in the third, and in May, 1890, the classification was again changed by the Department, making only two classes, with twenty in the first and ten in the second. After being paid under this new classification until July 1, 1891, the Treasury Department then held that it was illegal, checking the amount that had been paid, and refusing to pass any account for payment except under the original classification before any change was made. The checkage was not enforced, but by order of the Navy Department, upon the decision of the Second Comptroller, the original classification was restored and the men paid accordingly.

This decision was a great hardship to the men, as they had been classified and received their pay in good faith, and it caused great dissatisfaction and tended to destroy the efficiency of the band. In view of the above facts, and to establish the band on a firmer basis, I

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earnestly request that the Department will recommend such legislation as it may deem proper to effect this result.

By authority of the Department a board to inquire into and report upon the subject of organization and promotion of officers was convened during the year, with orders, after investigation, to make such recommendations as might be found necessary to insure a condition of increased efficiency in the Marine Corps.

The board has made a report, which has been forwarded to the Department, recommending changes, which, if carried out, will relieve the present stagnation, particularly in the list of captains, many of whom entered the service at the commencement of the late war, and under the present régime will still hold the same rank when retired at the age of 64 years, and improve the condition of the enlisted men.

I trust that the views of the board will meet with the approval of the Hon. Secretary of the Navy, and that he may make such recommendations to Congress as he may deem proper to insure promotion to many worthy officers, and to increase the efficiency of the Marine Corps.

Also, a board was convened to consider and report upon what, if any, changes were necessary in the uniform of the officers and enlisted men of the corps, and also to revise the standard samples of supplies used in the Marine Corps, to meet the demands of the service, the ones now in use having been established in 1881.

The board has made a preliminary report, recommending a number of additions and changes in the clothing and equipment of enlisted men, which could be made without material cost, and the recommendations having been approved by the Department, I directed the quartermaster to include the different articles in his proposals for supplies for the present year.

The following are the additions, viz: Canvas fatigue suits, leggings, mattresses, wire bunk bottoms, pillows, pillowcases, and sheets, and black helmets instead of shakos.

These changes will be of great benefit and comfort to the enlisted men of the corps, and will tend to decrease the number of desertions.

The quartermaster of the corps reports, as a result of his last inspection, that the barracks and officers' quarters at the different stations are in a better condition than ever before, and that with the addition of a dormitory to the barracks at League Island, and the introduction of electric light at the barracks at Mare Island, Cal. (for which last-named purpose Congress at its last session made a special appropriation of $3,000), and in addition to the officers' quarters at Portsmouth, N. H., but little else in the way of repairs is needed. The new barracks at the navy-yard, Norfolk, Va., was completed and occupied in December last. Contracts for the erection of a barracks at Sitka, Alaska, have been awarded by the quartermaster to Mr. C. W. Young, of Juneau, Alaska, for the sum of $5,955.68.

On October 1, 1891, there were 1,981 enlisted men in the corps, of whom 1,046 were on board ships in commission, and 935 doing duty at the several shore stations.

Since October, 1890, there have been 1,088 casualties in the enlisted strength, caused by deaths, discharges, retirements, and desertions, and since the same date there have been 1,137 enlistments and reënlistments.

Colonel Commandant Charles G. McCawley was retired from active service, January 29, 1891, under operation of law, having reached the age of 64 years; and Lieut. Col. George P. Houston, on his own application, February 1, 1891, having served over 30 years; First Lieuts.

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H. K. Gilman and William H. Stayton resigned on December 22, 1890, and June 30, 1891, respectively; Maj. D. M. Cohen, retired, died on May 29, 1891, and First Lieuts. S. L. Jackson and J. G. McWhorter on October 26, 1890, and June 27, 1891.

These with other casualties since July 1, 1890, caused seven vacancies on July 1, 1891, which were filled by graduates of the Naval Academy, and these young officers are now being instructed at the school of application, Marine Barracks, Washington, D. C.

The usual estimates were forwarded to the Department on September 4 last, and a duplicate set is inclosed with this report as requested.

In concluding this report it may not be deemed inappropriate for me to call the attention of the Department to the death at his residence, Rosemont, Mont Co., Pa., on the 13th instant of Col. Charles G. McCawley, late commandant of the corps. Col. McCawley entered the Marine Corps as second lieutenant in 1847 and served continuously, passing through the various grades until he arrived at the command of his corps. He served during the Mexican and civil wars most creditably to himself both as a gentleman and an officer, as demonstrated by the fact that he was twice brevetted for gallant and meritorious conduct in the face of the enemy.

The improvement of the corps during the period that Col. McCawley commanded it shows the impress of his indefatigable and conscientious work. He was buried at Abington Cemetery, Mont Co., Pa., October 16, 1891.

Very respectfully,

CHARLES HEYWOOD,
Colonel Commandant.

Hon. B. F. TRACY,
Secretary of the Navy, Washington, D. C.

U. S. MARINE BARRACKS,
Mare Island, Cal., October 16, 1891.

SIR: I have the honor to report that the Marine detachment, consisting of three officers (First Lieuts. Turner and Pendleton and myself) and forty enlisted men, embarked by your telegraphic order of June 19th, last, for special duty in Bering Sea, in connection with the agreement between Great Britain and the United States for the arrest of seal poaching, returned on the 14th instant, having been absent nearly four months.

We went on board the steamer *Al-Ki*, a chartered vessel belonging to the Pacific Coast Steamship Company, at Mare Island, on the 21st, and sailed from San Francisco on the 22d of June. Arrived in Bering Sea July 2d, and at Iliuliuk, Ounalaska, Aleutian Islands, the same day, in advance of the other vessels ordered.

The U. S. S. *Thetis* arrived on the 3d, the *Mohican* on the 8th, and the *Alert* on the 9th of the same month, and the *Marion* on the 14th of August, making the combined force of marines present 5 officers and 113 men. H. M. S. *Nymphe*, from Victoria, British Columbia, joined the fleet on the 7th of July, the *Pheasant* on the 12th, and the *Porpoise*, from the China station, on the 27th, each provided with a guard of marines.

While the men-of-war, together with the United States revenue cutters *Rush* and *Corwin*, were engaged in cruising and furnishing all sealing, whaling, and fishing vessels with notice of the President's proclamation and the orders of the British Government relative to the fur seal fisheries, the *Al-Ki* acted as harbor and prison ship at Ounalaska. The crews of vessels seized were promptly transferred to our custody upon being brought into port and were uniformly well treated.

Owing to the determined attitude of the combined Governments, and the custom of giving each vessel found a preliminary warning, but four seizures were necessary. These were the schooners *E. B. Marvin*, British, July 6th, the *La Ninfa*, American, July 14th, the *Ethel*, American, July 30th, and the *Otto*, British, August 31st. The total number of prisoners received was 48, including a dozen Nationalities and 7

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Nootka Sound Indians, h inters. The crew of the *Otto* was not tranferred to the *Al-Ki*.

Of these vessels, the first and the last were sent to Victoria for adjudication, and the others were towed to Sitka, 1,200 miles, by the *Al-Ki*, and turned over to the United States marshal for Alaska. A prize crew of 1 corporal and 3 privates was put aboard of the *La Ninfa*, and 2 privates on the *Ethel*, each crew containing an expert signalman, by whom communication was maintained with the towing steamer. This unusual duty was exceedingly well performed.

While at Sitka a public drill was given on shore, in the Plaza, August 14, in the presence of the governor of Alaska, the judge of the United States Court, the collector of customs, and other distinguished citizens, which elicited many compliments and gratified the inhabitants, Russian, American and Indian, of that quiet town.

August 15th the *Al-Ki* left for Ounalaska, arriving on the 20th. After September 1st, no sealing vessels were found in Bering Sea, and after the 15th the weather became generally stormy, and continued so until our departure, October 5th, when the mountains were all snow-clad.

The entire summer was cool and moist, with much fog, and either overcoats or rubber clothing were in use at some time each day.

The men were as comfortably quartered as circumstances would permit, and had liberal rations, save as to fresh meat, a privation common to all of the ships in the expedition. With a hauling seine we caught great quantities of fish, salmon, haddock, cod, trout, herring, and flounders, which partly supplied the absence of meat.

Very good clams were also obtained near the anchorage. This region furnishes neither vegetables nor fruits, except a few berries late in the season. These, salmonberries, and blueberries, grow wild and are very abundant and good. Daily liberty was given the men, who preserved excellent relations with the natives (Aleuts) as well as with the white citizens.

Throughout our absence drills and instructions were unremitting, and every officer and man is trained in boating, in the Army signal code, in skirmishing, the bayonet exercise, and target practice, in addition to his routine duties. The men were organized into boats' crews from the first day, and did all of the boarding and pulling required. An excellent rifle range up to 300 yards and four signal stations were established on Amnak Island, and great interest was taken in the competitions.

The exhibiton drill given in the village of Iliuliuk was highly praised by the United States officials and others present.

Much trouble was occasioned during the cruise by mutinous manifestations on the part of the sailors of the ship, who were foreigners, and "union men," and by some of the engineers'department.

The aid of the civil law was invoked twice, and on the third occasion the master of the vessel came to my office (September 9), and said: "Captain Cochrane, if the worst comes to the worst, can the Marines help me out" (referring to the attitude of his crew)? I replied: "Yes; you can set everyone of them on the beach, firemen and all, and we'll take the ship to San Francisco." He has reported to the steamship company that this declaration ended the troubles. In this connection I inclose extracts from the San Francisco press.

I am thankful to report the detachment of full strength and all well, and to be able to say that its conduct has been most creditable.

The total distance traveled is about 6,600 miles.

I am, sir, very respectfully, yours,

HENRY CLAY COCHRANE,
Captain U. S. Marine Corps, late Commanding Detachment.

The COLONEL COMMANDANT, U. S. MARINE CORPS,
Headquarters, Washington, D. C.

General Order No. 1.

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., May 1, 1891.

1. The colonel commandant takes pleasure in formally announcing to the Marine Corps the establishment of a School of Application at the headquarters of the Corps, with the approval of the Secretary of the Navy, as contained in the following communication:

NAVY DEPARTMENT,
Washington, April 18, 1891.

"SIR: The Department is in receipt of your communication of the 13th instant, submitting for its consideration an outline of the course of instruction for a school

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of application, at the headquarters of the Marine Corps, for officers, non-commissioned officers, and privates of the Corps; and the course of instruction for the school, as proposed, is, in accordance with your recommendation, approved.

"Very respectfully,

"B. F. TRACY,
"*Secretary of the Navy.*

"The COMMANDANT U. S. MARINE CORPS,
"*Headquarters, Washington, D. C.*"

2. Outline of course of instruction:

First. *Infantry tactics and small-arm instruction.*—To include the school of the soldier; school of the company; school of the battalion, and evolutions of the brigade; bayonet exercise; instructions for skirmishers; trumpet signals; ceremonies, and guard duty; position and aiming drills; target practice; estimating distances, and pistol practice.

Second. *Gunnery instruction.*—To include machine and rapid-fire gun drills; naval great-gun exercise; nomenclature and description of guns, carriages, mounts, and gun implements; description and mode of manufacture of gunpowder, projectiles, cartridges, fuses, and primers; pointing, sighting, sights, and range finding.

Third. *Torpedoes.*—The various kinds and their uses; how exploded; how used offensively and defensively.

Fourth. *High explosives.*—Gun cotton, nitroglycerine, dynamite, fulminates—how prepared, preserved, used; care necessary in handling.

Fifth. *Electricity.*—How produced; conductors and insulators; heating effects of currents, how applied to fire guns and torpedoes; simple electrical tests and measurements; telegraphy.

Sixth. *Field service and modern tactics.*—Exercises in application in summer camps; marches; duty of advanced guards; camps and bivouacs; outpost duty; patrols; signalling; street, bush, and open-country fighting; formations for attack and defense; importance of cover; care of wounded; application of the tourniquet.

Seventh. *Field intrenchments.*—To embrace the making on the ground of rifle pits, shelter trenches, gun pits, obstacles, and improvised field defenses.

In addition to the foregoing, non-commissioned officers and other enlisted men of sufficient intelligence will receive careful instruction in the use of the logarithms, solution of plane triangles, and the practical use in the field of angle-measuring instruments in making military reconnoissances and hasty surveys.

Non-commissioned officers will be instructed also in the duties of guards when embarked, landing and campaigning with the Naval brigade, and the best formation for fighting against superior numbers armed with inferior weapons.

Additional instruction for commissioned officers is left to the discretion of the colonel commandant.

DESIGNATION.

3. The school is officially designated the "School of Application of the United States Marine Corps," and it will be under the direct care and supervision of the colonel commandant.

ORGANIZATION.

4. The School of Application shall consist of a director of instruction, who shall have the immediate command of the school and post; instructors and assistant instructors, and such officers and enlisted men as may be assigned to it for duty or instruction.

5. The school shall have two divisions, one for commissioned officers and one for enlisted men.

ADMINISTRATION.

6. Instructors and assistant instructors shall, as far as practicable in the judgment of the commanding officer of the school, be exempt from all duties that will in any way interfere with their preparation for and proper performance of duty as instructors and assistant instructors.

7. Instruction will be given according to a regular programme, and in such manner and by such methods as the colonel commandant may hereafter prescribe, and which will be duly announced in general orders.

8. The instruction as prescribed shall be obligatory for all commissioned officers and non-commissioned officers, and for such other enlisted men as may be assigned to the school for duty or instruction.

9. The course of instruction in military hygiene will be under the direction of the medical officer of the post.

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10. Instructors and assistant instructors shall keep marks of all recitations and exercises, and shall submit the same at the end of each week to the director of instruction, who will forward them to the colonel commandant as a part of the weekly report of progress.

These marks will be used as aids in determining questions of merit and proficiency.

11. Maximum marks given for perfect recitations and exercises shall be 3; for a total failure 0; and between these limits according to quality, fractions expressed in tenths.

12. A board of three officers to be designated by the colonel commandant, shall be appointed to attend and witness the examinations at the close of each course of instruction at the school.

It shall be the duty of the board to examine into the actual condition of the school respecting its discipline, the methods of instruction employed, etc. The board shall report its observations and make any recommendations it may deem advisable to the colonel commandant.

13. The commanding officer of the school will make to the colonel commandant an annual report of the progress and wants of the school, and he will recommend such alterations in and additions to the programme of instruction and code of regulations as he may from time to time consider necessary or advisable.

14. With the course of instruction as outlined for the School of Application, and a modified course for branch schools at each post, together with the instruction, officers are able to impart to their guards on board ship, the Marine Corps will be enabled to keep pace with recent progress in the profession of arms, and to this end the colonel commandant confidently relies upon the coöperation of all the officers of the corps.

CHARLES HEYWOOD,
Colonel Commandant.

No. 81.

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., September 4, 1891.

SIR: I inclose herewith for your approval the usual estimates for the support of the U. S. Marine Corps for the fiscal year ending June 30, 1893.

In addition to the usual estimates, I have asked in those of the quartermaster for $2,500 for altering and enlarging the officers' quarters at Portsmouth, N. H., the quarters there being totally insufficient for the officers required to perform the necessary duty at that station.

Also $3,000 for a suitable barrack at the U. S. naval station, Port Royal, S. C., for the use of a marine guard recently ordered to that station for the protection of Government property, as well as to insure greater security to those who are resident within its limits, as the construction of the dry dock will bring a great many vicious laborers to the island.

I also ask for $1,000 to enable the Marine Corps to make a proper exhibit at the World's Columbian Exhibition at Chicago in 1893.

The accompanying letter will explain the necessity for the several items of the quartermaster's estimates.

I have included in those of the paymaster an increase of pay for the chief clerks of the quartermaster, adjutant and inspector and my own office, to correspond with that allowed the chief clerk of the paymaster, also for the clerk of the assistant quartermaster in Philadelphia, Pa., to correspond with that of the one in Washington, D. C.

I also inclose a letter from the paymaster in relation to his estimates.

Trusting that the additional amounts asked for will meet the approval of the honorable Secretary of the Navy,

I am, very respectfully, your obedient servant,

CHARLES HEYWOOD,
Colonel Commandant.

Hon. B. F. TRACY,
Secretary of the Navy, Washington, D. C.

HEADQUARTERS U. S. MARINE CORPS,
PAYMASTER'S OFFICE,
Washington, D. C., August 31, 1891.

SIR: I respectfully submit herewith estimates for the payof officers, noncommissioned officers, musicians, and privates, and civil force of the U. S. Marine Corps for the fiscal year ending June 30, 1893.

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These estimates show an increase of $8,221.32 over the estimates for the present fiscal year, viz:

Pay of officers on the retired list, increase	$750.00
Pay of retired enlisted men, increase	8,871.32
	9,621.32
Pay of civil force, decrease	1,400.00
	8,221.32

Very respectfully,

GREEN CLAY GOODLOE,
Major and Paymaster U. S. Marine Corps.

The COLONEL COMMANDANT U. S. MARINE CORPS,
Headquarters, District of Columbia.

Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the paymaster U. S. Marine Corps.

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Amount appropriated for the current fiscal year ending June 30, 1892.
PAY MARINE CORPS.		
Pay of officers on the active list:		
For 1 colonel commandant, 1 colonel, 2 lieutenant-colonels, 1 adjutant and inspector, 1 paymaster, 1 quartermaster, 4 majors, 2 assistant quartermasters, 1 judge-advocate-general U. S. Navy, 19 captains, 30 first lieutenants, and 12 second lieutenants	$181,300.00	
Pay of officers on the retired list:		
Three colonels, 3 lieutenant-colonels, 1 quartermaster, 1 assistant quartermaster, 6 captains, 3 first lieutenants, and 3 second lieutenants	44,362.50	
Pay of noncommissioned officers, musicians, and privates:		
One sergeant-major, 1 quartermaster-sergeant, 1 leader of the band, 1 drum-major, 50 first sergeants, 140 sergeants, 180 corporals, 30 musicians, 96 drummers and fifers, and 1,600 privates	404,700.00	
Pay of retired enlisted men:		
One sergeant-major, 1 drum-major, 7 first sergeants, 11 sergeants, 2 first class musicians, 1 corporal, 2 drummers, 1 fifer, and 34 privates	19,766.00	
Undrawn clothing:		
Payment of discharged soldiers for clothing undrawn	35,000.00	
Mileage (Rev. Stat., p. 272, secs. 1596, 1623):		
Mileage of officers traveling without troops	9,000.00	
Commutation of quarters (act June 30, 1834, vol. 4, p. 713, secs. 4, 5):		
Commutation of quarters to officers on duty without troops, where there are no public quarters (acts Mar. 2, 1847, Aug. 5, 1854, vol. 9, p. 155, sec. 3, vol. 10, p. 586, sec. 1)	4,000.00	
PAY OF CIVIL FORCE (act Feb. 21, 1857, vol. 11, p. 163, sec. 1),		
In the office of the colonel commandant (act July 17, 1862, vol. 12, p. 594, sec. 2):		
One chief clerk, $1,540.80 (increase $59.20 submitted) (act June 30, 18, 1864, vol. 13, p. 144, sec. 1)	1,600.00	
One messenger, at $80.94 per month (act Mar. 3, 1865, vol. 13, p. 487, sec. 1)	971.28	
In the office of adjutant and inspector (act July 28, 1864, vol. 14, p. 334, sec. 13):		
One chief clerk, $1,540.80 (increase $59.20 submitted) (act Mar. 2, 1867, vol. 14, 422, sec. 1)	1,600.00	
One clerk (act Mar. 2, 1867, vol. 14, p. 517, sec. 7)	1,496.52	
In the office of the paymaster (act July 15, 1870, vol. 16, p. 330, sec. 3):		
One chief clerk (act Jan. 30, 1885, vol. 23, pp. 293, 294, sec. 1)	1,600.00	
One clerk (act Feb. 14, 1885, vol. 23, p. 305, sec. 1)	1,496.52	
One clerk (Navy Register)	1,257.12	
In the office of the quartermaster (act July 18, 1816):		
One chief clerk, $1,540.80 (increase $59.20, submitted) (act June 30, 1890, vol. 26, pp. 202, 203, sec. 1)	1,600.00	
One clerk	1,496.52	
One clerk	1,257.12	
In the office of the assistant quartermaster, Washington, D. C.:		
One clerk	1,400.00	
In the office of the assistant quartermaster, Philadelphia, Pa.:		
One clerk $1,257.12 (increase $142.88, submitted)	1,400.00	
One messenger, at $1.75 per diem	640.50	
Total pay of civil force	17,815.58	
	715,988.08	699,766.50

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HEADQUARTERS U. S. MARINE CORPS,
QUARTERMASTER'S OFFICE,
Washington, D. C., September 4, 1891.

SIR: I herewith submit the annual estimates for the support of the quartermaster's department U. S. Marine Corps, fiscal year 1892–'93, and respectfully call your attention to the following changes in the amounts estimated for as against the amounts appropriated for the same objects present fiscal year (1891–'92), giving the reasons that in my judgment make these changes necessary and desirable:

Provisions (increased)	$6,396.14
Clothing (increased)	5,000.00
Fuel (decreased)	2,500.00
Military stores (increased)	2,776.00
Transportation and recruiting (no change).	
Repair of barracks (increased)	32,500.00
Forage (no change).	
Hire of quarters (no change).	
Contingent (decreased)	500.00

Provisions.—In the naval appropriation bill, approved March 2, 1891, appear the words: "And no law shall be construed to entitle enlisted marines on shore duty to any rations or commutation thereof other than such as now are, or may hereafter be, allowed to the enlisted men of the Army."

Consequently, contracts for present fiscal year, 1891–'92, were made upon the basis of the Army ration, at an average cost of $17.81 per hundred rations. These figures have been taken as the probable average cost of the rations for the next fiscal year (1892–'93), and figure up $71,507.15.

Clothing.—Certain changes will have to be made in the uniforms of the enlisted men of the corps that will result in an increased expense during the next fiscal year chargeable to clothing. A board of officers, authorized by the Department, is now considering what changes are needed, and their introduction, if adopted, will cause a slightly increased expense, which will be confined to the first year, or, in other words, to the year of their introduction.

You are aware of the fact that on June 30, 1891, the supply of clothing on hand was so limited that you had to stop recruiting, and were unable to send the necessary men to sea for the reason that they could not be properly fitted out.

We have no surplus stock to draw upon, and no matter how carefully the clothing may be distributed during the fiscal year (1891–'92), you will have but little, if any, on hand on June 30, 1892.

Fuel.—Based upon the contract price of fuel present fiscal year, 1891–'92, which is lower than prevailed the year previous (1890–'91), I have reduced the estimate for this article, as mentioned above.

Military stores.—Under this head has been included several items that have never appeared before, and for which, consequently, no appropriation was required.

The establishment, by order of the Navy Department, of a school of application, for officers and enlisted men of the corps, at these headquarters, has been accomplished; consequently articles, such as models, instruments, text-books, marksmen's badges, and an increased amount of ammunition for the rifle, as well as a quantity of ammunition for the revolving cannon, become necessary.

Transportation and recruiting.—It is believed that the same amount as appropriated under this head for the present fiscal year will answer for the fiscal year 1892–'93.

Repair of barracks.—The increase under this head is explained as follows: $30,000 "for the erection of a fireproof building for use as offices (and storage of records) of commandant, adjutant, and inspector, paymaster, quartermaster, and assistant quartermaster."

This item was included in last year's estimates, but did not receive the favorable consideration of Congress, though the Secretary of the Navy addressed the Naval Committee a strong letter upon this particular subject. It is a matter of so grave an importance, that I have again included it, trusting that the subject may impress the Naval Committee and receive the favorable consideration of Congress. In this connection, I respectfully call your attention to the reasons why the building is necessary, as set forth in my letter to your office dated September 29, 1890, in which were submitted the estimates for present fiscal year (1891–'92).

Twenty-five hundred dollars for altering and enlarging the officers' quarters at Portsmouth is asked for, upon the grounds of insufficiency of rooms at that post, and is strongly urged by its commanding officer.

The marine guard recently ordered to duty at the naval station Port Royal, S. C., are living under canvas. As a permanent force of marines will be required at

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this station, I have included the sum of $3,000 with which to erect a suitable barracks at the above-named station.

Forage.—Remains the same as this fiscal year's (1891-'92) appropriation.

Contingencies.—Wire bunk bottoms, mattresses, pillows, sheets, and pillow cases, mess and kitchen utensils, of the same character as are provided in the Army for the use of the soldier having been adopted for the use of the enlisted men of the Marine Corps, an additional sum of $2,500 is asked for to meet the expense.

The item of $1,000 is necessary to enable the Marine Corps to meet the necessary expenses connected with the exhibit that it is proposed to make at the World's Columbian Exhibition at Chicago in 1893.

Very respectfully, your obedient servant,

H. B. LOWRY,
Major and Quartermaster, U. S. Marine Corps.

The COLONEL COMMANDANT, U. S. MARINE CORPS,
Headquarters.

[First indorsement.]

HEADQUARTERS U. S. MARINE CORPS,
Washington, D. C., September 4, 1891.

Respectfully referred to the Secretary of the Navy, in connection with the estimates of the quartermaster, U. S. Marine Corps.

CHARLES HEYWOOD,
Colonel Commandant, U. S. Marine Corps.

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the U. S. Marine Corps.

Detailed objects of expenditure, and explanation.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
PROVISIONS.			
For 1,100 noncommissioned officers, musicians, drummers, fifers, and privates, and for commutation of rations for 11 enlisted men detailed as clerks and messengers; also for payment of board and lodging for recruiting parties: *Provided*, That hereafter the enlisted men of the Marine Corps serving on shore duty shall receive the same rations or commutation therefor as are now or may hereafter be allowed to the enlisted men of the infantry of the Army	$71,507.15		
For amount required to be transferred to paymaster U. S. Marine Corps on account of rations to retired men, $82.13 per annum	4,188.63		
NOTE No. 1.—The commutation in lieu of rations in kind at the rate of $1.75 to these enlisted men; also commutation of quarters at $21 and $10 per month, authorized by order of the Navy Department, dated June 20, 1880, and July 30, 1885.		$75,695.78	$69,299.64
NOTE No. 2.—There are 51 retired enlisted men at this date.			
CLOTHING.			
For 2,100 noncommissioned officers, musicians, and privates	.....	80,000.00	75,000.00
FUEL.			
For heating barracks and quarters, for ranges and stoves for cooking purposes, fuel for enlisted men, and sales to officers	.....	20,500.00	23,000.00
MILITARY STORES.			
For pay of chief armorer, at $3 per day, $969; 3 mechanics, at $2.50 each per day, $2,347.50; in all			
For purchase of military equipments, such as cartridge boxes, bayonet scabbards, haversacks, blanket bags, knapsacks, canteens, musket slings, swords, drums, trumpets, flags, waist belts, waist plates, cartridge belts, spare parts for repairing muskets, text-books, models, instruments, and repairs thereof, medals for excellence in gunnery and rifle practice, good-conduct badges, for the establishment and maintenance of targets and ranges, for hiring established ranges, and for transportation to and from ranges, for procuring, preserving, and handling ammunition, etc	3,286.50		
For purchase of ammunition	9,000.00		
For purchase and repair of instruments for band, purchase of music and musical accessories	2,000.00		
	500.00	14,786.50	12,010.50
TRANSPORTATION AND RECRUITING.			
For transportation of troops and for the recruiting service	.....	15,000.00	15,000.00
REPAIRS OF BARRACKS.			
At Portsmouth, N. H., Boston, Mass., Brooklyn, N. Y., League Island, Pa., Annapolis, Md., headquarters and navy-yard, Washington, D. C., Norfolk, Va., Port Royal, S. C., Pensacola, Fla., Mare Island, Cal., and Sitka, Alaska, and per diem to enlisted men employed under the direction of the Quartermaster's Department on the repairs of barracks and other public buildings	10,000.00		
For erection of offices at headquarters	30,000.00		
For altering and enlarging officers' quarters at Marine Barracks, Portsmouth, N. H	2,500.00		
For erection of a building for Marine Barracks at Naval Station, Port Royal, S. C., appropriation to be immediately available	3,000.00		
For rent of buildings used for the manufacture of clothing, storing supplies, and office of assistant quartermaster, Philadelphia, Pa	1,300.00	46,800.00	14,300.00

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Estimates of appropriations required for the service of the fiscal year ending June 30, 1893, by the U. S. Marine Corps—Continued.

Detailed objects of expenditure, and explanation.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
FORAGE.			
For forage in kind for five horses of the Quartermaster's Department and the authorized number of officers horses		$3,500.00	$3,500.00
HIRE OF QUARTERS.			
For hire of quarters for officers serving with troops where there are no public quarters belonging to the Government, and where there are not sufficient quarters possessed by the United States to accommodate them	$4,500.00		
For hire of quarters for 7 enlisted men employed as clerks and messengers in commandant's, adjutant and inspector's, quartermaster's and paymaster's offices, Washington, D. C., and assistant quartermaster, Philadelphia, Pa., at $21 per month each	1,764.00		
For hire of quarters for 3 enlisted men employed as above at $10 each per month	360.00		
		6,624.00	6,624.00
CONTINGENCIES.			
For ferriage, freight, toll, cartage, funeral expenses of marines, stationery, telegraphing, rent of telephones, purchase and repair of typewriters, apprehension of stragglers and deserters, per diem of enlisted men employed on constant labor for a period of not less than ten days, repair of gas and water fixtures, mess and kitchen utensils for enlisted men, such as bowls, plates, knives, forks, spoons, etc., packing boxes, wrapping paper, oil-cloth, crash, rope, twine, camphor and carbolized paper, tools for carpenters' and police purposes, iron safes, public horses, carts, wheelbarrows and repairs of same, harnesses, public wagons, medicines and services of veterinary surgeons, hose, repair of fire extinguisher, hand fire grenades, purchase and repair of stoves, ranges, grates, and furnaces, ice, towels, and soap for offices, postage stamps for foreign postage, books, newspapers, and periodicals, improving parade grounds, repair of pumps and wharves, laying drain, water and gas pipes, gas and gas oil, and expenses of the installation and maintenance of electric light, straw for bedding, mattresses, mattress covers, pillows, wire bunk bottoms for enlisted men at the various posts, furniture for Government houses, offices and barracks and repairs of same and for all emergencies and extraordinary expenses arising at home and abroad, but impossible to anticipate or classify, in all		60,000.00	30,500.00
COLUMBIAN EXHIBITION.			
For the selection, purchase, preparation, and arrangement of such articles and material as may be deemed advisable to exhibit at the World's Columbian Exhibition		1,000.00	
Total		293,906.28	249,234.14

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MARINE CORPS—SUPPLEMENT.

SCHEDULES OF PROPOSALS.

HEADQUARTERS U. S. MARINE CORPS,
QUARTERMASTER'S OFFICE,
Washington, D. C., January 14, 1892.

SIR: I herewith inclose abstracts in duplicate of proposals for furnishing rations, fuel, and supplies to the U. S. Marine Corps during the fiscal year ending June 30, 1892.

Very respectfully, your obedient servant,

H. B. LOWRY,
Major and Qartermaster U. S. Marine Corps.

Hon. B. F. TRACY,
Secretary of the Navy.

HEADQUARTERS U. S. MARINE CORPS,
Commandant's Office, January 14 1892.

Forwarded.

CHARLES HEYWOOD,
Colonel Commandant, U. S. Marine Corps.

Schedule of proposals received for supply of rations for the Marine Corps for the year 1892, under advertisement from the Quartermaster's Office, dated May 2, 1891.

Names of contractors.	Portsmouth, N. H.	Charlestown, Mass.	Brooklyn, N. Y.	Philadelphia, Pa.	Washington, D. C.	Gosport, Va.	Annapolis, Md.	Mare Island, Cal.
Frank Hume				$19.53	$16.73		$18.53	
J. C. Ergood & Co	*$20.25	*$18.99	$18.45	*19.21	*14.73	$18.50	*17.68	
John Harts			17.97					
Andrew Koch			19.00					
M. J. Doran & Co	25.00	19.00						
C. S. Hewlett			*16.10					
J. E. Chase	21.98							
C. A. Simonds		23.40						
J. T. Parker & Bro						17.39		
S. J. Gerrish	20.98							
J. Brownlie								$19.45
W. H. Belford			17.47					
J. Stutz								22.50
W. L. Kelly								*18.75
A. J. Bacon & Co	24.33	20.99	25.00					
J. Kealy							18.20	
T. J. Barlow						*16.80		
J. B. Bryan & Bro					22.90			

* Accepted.

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Schedule of proposals received for supply of wood and coal to the Marine Corps, under advertisement from Quartermaster's Office, dated May 2, 1891.

Names of bidders.	Where to be delivered.	Wood, per cord.			Coal, per ton.					
		Oak, in stick.	Pine, in stick.	Pine (kindling), sawed and split.	Red ash, egg.	Red ash, stove.	White ash, egg.	White ash, stove.	White ash, nut.	White ash, furnace.
G. L. Sheriff	Offices and officers' quarters, Washington and Georgetown, D. C., and within 1 mile of limits of said cities.	$5.97	$4.97	$6.29	$5.99	$6.29	$5.49	$5.69	$5.49	$5.49
J. Z. Williams	do	*4.75	*4.25	*5.00	*5.40	*5.50	*5.00	*5.20	*4.90	*5.00
G. L. Sheriff	Marine barracks and navy-yard, Washington, D. C.	5.67	4.97	.....	.....	.....	4.95	5.69	5.09	5.05
J. Z. Williams	do	*4.50	*4.00	.....	.....	.....	*4.90	*5.20	*4.90	*5.00
S. G. French	Offices and officers' quarters and rendezvous, Philadelphia, Pa.	7.40	.....	*8.40	.....	.....	.....	.....	.....	.....
J. J. Convery	do	*6.70	.....	9.70	.....	*4.70	*4.70	.....	.....	.....
John Kealy	Marine barracks, Annapolis, Md.	4.69	*3.69	*4.69	5.50	5.75	4.89	5.00	5.00	4.50
J. S. M. Basil	do	4.48	3.79	5.74	.....	5.54	4.89	5.04	.....	.....
J. B. Flood	do	*4.42	3.84	4.98	.....	*4.98	*4.79	*4.98	.....	.....
W. G. Parker	Officers' quarters, Norfolk, Va.	6.00	.....	.....	.....	.....	.....	6.25	.....	.....
Neimeyer & Bridges	do	*5.50	5.50	7.00	.....	.....	.....	*5.95	.....	.....
W. G. Parker	Marine barracks, Norfolk, Va.	5.50	5.50	.....	.....	.....	.....	5.75	.....	.....
Neimeyer & Bridges	do	*5.00	*4.50	6.00	.....	.....	.....	*5.43	.....	.....
J. Hitt	Marine barracks, Portsmouth, N. H.	.....	.....	.....	.....	.....	6.57	.....	.....	6.57
S. J. Girrish	do	6.90	.....	.....	.....	.....	.....	.....	.....	.....
E. C. Spinney	do	*6.75	5.00	6.00	.....	.....	.....	.....	.....	.....
J. M. Salter	do	8.00	7.00	10.50	.....	.....	7.00	.....	.....	7.00
C. E. Walker & Co	do	7.50	6.00	10.00	.....	.....	6.75	.....	.....	6.75
S. G. French	do	7.40	6.40	9.40	.....	.....	*6.44	.....	.....	*6.44
Do	Marine barracks, Charlestown, Mass.	9.44	9.44	9.84	.....	.....	.....	.....	.....	.....
J. J. Convery	do	13.00	13.00	14.00	.....	.....	7.12	7.42	7.12	7.12
J. E. Lewis & Co	do	*9.00	*7.00	*9.75	.....	.....	*6.45	*6.45	*6.45	*6.25
D. B. Duncan & Son	Marine barracks, Brooklyn, N. Y.	.....	.....	.....	.....	.....	*4.65	.....	*4.65	.....
J. J. Convery	do	*9.30	*9.30	*9.80	.....	.....	5.39	.....	5.39	.....
S. G. French	do	9.44	9.44	9.84	.....	.....	4.74	.....	4.94	.....
H. M. Newton	do	.....	.....	.....	.....	.....	4.74	.....	4.64	.....
S. G. French	Marine barracks, League Island, Pa.	.....	.....	.....	.....	.....	6.82	.....	6.82	.....
J. J. Convery	do	*9.40	*9.40	.....	.....	.....	5.90	5.90	5.90	.....
Bloomington Mining Co.	do	.....	.....	.....	.....	.....	*4.99	*5.14	*4.94	.....
J. McCudder	Marine barracks, Mare Island, Cal.	10.00	10.00	12.00	.....	.....	13.75	.....	.....	.....
H. Rosenfeld	do	.....	.....	.....	.....	.....	*13.99	.....	.....	.....
N. Claro	do	9.35	9.35	11.00	.....	.....	19.00	.....	.....	.....
S. G. French	do	10.00	10.00	13.00	.....	.....	17.14	.....	.....	.....
W. Walker	do	.....	.....	.....	.....	.....	15.00	.....	.....	.....
Aden Bros	do	*8.94	*8.94	*10.00	.....	.....	.....	.....	.....	.....

*Accepted.

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Schedule of proposals for supplies for the U. S. Marine Corps, under advertisement inviting proposals, dated May 2, 1891.

Names of bidders.	Class.	Amount.
Dell and J. C. Noblit	1	$2,645.00
William F. Brown	1	524.37
Valentine Storts	*4	392.06
Hartford Woven-Wire Mattress Co	*1	660.00
Liberty Woolen Manufacturing Co	1	13,725.00
Paul J. Field, jr	*4	530.68
Louis Sichel	*1	1,160.00
William H. Wiley & Son	*1	825.00
Rowland A. Robbins	*1, 2, 3	23,148.16
E. C. Cook & Bros	1	1,155.00
George F. Roedel	*1	10,320.00
Lyon Bros	1	975.00
Charles F. Bush	1	5,835.00
Thomas J. Hood	*1, 2, 3	15,830.30
Horstmann Bros. & Co	*1, 2, 3, 4	14,474.57
Henry F. Kent	*1	28,572.00
R. Rich & Sons	1	5,131.14
S. Allen Evans	*1, 3	21,636.01
Melville Lindsay	1	520.00
John M. Duffy	1	2,250.00
Richard Levick's Sons & Co	1	545.00
William F. Bernstein	*1	810.97
Henry C. Harper	*1, 2, 3	4,620.25
Tiscot & Shults	1, 2, 3	18,332.04
B. Y. Pippey & Co	*1	41,129.00
Hans Henken	*1, 2, 3	20,550.74
Wendell, Fay & Co	2	4,400.00
Rudolph Wurlitzer	*2	467.70
William McKnight	*1	8,920.00

*Accepted for part of class.

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REPORT

OF THE

BOARD OF VISITORS, 1891,

TO THE

UNITED STATES NAVAL ACADEMY.

Senator W. E. CHANDLER, *President*.....Concord, N. H.
Hon. H. A. HERBERT, *House of Representatives, Vice-President*.....Montgomery, Ala.
Senator I. G. HARRIS.....Memphis, Tenn.
Hon. J. P. DOLLIVER, *House of Representatives*.Fort Dodge, Iowa.
Hon. W. C. WALLACE, *House of Representatives*.15 Wall street, New York City.
Commodore J. A. GREER, *U. S. Navy*.....2010 Hillyer Place, Washington, D.C.
Hon. GEORGE N. TILLMAN.....Nashville, Tenn.
Hon. A. R. MCGILL.....401 Nicollet Ave., Minneapolis, Minn.
GEORGE W. ATHERTON, LL. D.....State College, Pa.
Col. E. BIERER.....Hiawatha, Kans.
Mr. CHAS. A. COFFIN.....Boston, Mass.
Mr. HENRY H. SMITH, *Journal Clerk, House of Representatives*.....Washington, D. C.

U. S. NAVAL ACADEMY,
Annapolis, Md., June 6, 1891.

SIR: I have the honor to transmit herewith the report of the Board of Visitors to the Naval Academy.

Very respectfully, your obedient servant,

ALEX. SHARP, JR.,
Lieutenant U. S. N.,
Secretary to the Board.

Hon. SECRETARY OF THE NAVY,
Navy Department, Washington, D. C.

U. S. NAVAL ACADEMY,
Annapolis, Md., June 6, 1891.

SIR: The Board of Visitors met at the Board House, within the Academy grounds, on the morning of June 1, nine members being present, and were officially received with the usual ceremonies.

At 3 o'clock in the afternoon the Board organized by the election of Senator William E. Chandler as president and Representative H. A. Herbert as vice-president.

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The Board also elected as secretary Lieut. Alexander Sharp, jr., U. S. Navy, that officer having been ordered by the Superintendent of the Academy to report to the Board for the service.

Later, at various times during the first day or during the week, the other members of the Board, except one, appeared and took part in its work and deliberations.

George W. Atherton, LL. D., president of Pennsylvania State College, was selected to deliver the customary address to the cadets on the day of graduation.

The various committees were, by order of the Board, appointed by the president and vice-president, as follows:

STANDING COMMITTEES.

(1) *Conditions of admission to and discharge from the Academy.*—Hon. W. C. Wallace, Hon. George N. Tillman, Commodore J. A. Greer, Senator W. E. Chandler.

(2) *Subjects of Study and Standard of Scholarship.*—George W. Atherton, LL. D., Senator I. G. Harris, Hon. W. C. Wallace.

(3) *Grounds, Buildings, and Sanitary Condition.*—Senator I. G. Harris, Hon. A. R. McGill, Col. E. Bierer.

(4) *Seamanship, Ordnance, and Navigation.*—Commodore J. A. Greer, Hon. H. A. Herbert, Hon. J. P. Dolliver.

(5) *Discipline, Drill, Practical Exercises, Administration, and Police.*—Hon. H. A. Herbert, Hon. A. R. McGill, Mr. C. A. Coffin.

(6) *Steam, Mathematics, Physics, and Mechanics.*—Hon. A. R. McGill, Commodore J. A. Greer, Mr. H. H. Smith.

(7) *English Studies, Modern Languages, Drawing, Physiology, and Hygiene.*—Hon. George N. Tillman, Hon. W. C. Wallace, Mr. H. H. Smith.

(8) *Finance and Library.*—Col. E. Bierer, Hon. George N. Tillman.

(9) *Final Report.*—Hon. J. P. Dolliver, G. W. Atherton, Mr. H. H. Smith, Senator W. E. Chandler.

The formal letter addressed by the Secretary of the Navy to each member of the Board requested him to be present at the examination of the cadets, and this direction seems to be in accordance with the law providing for the visitation and with former custom. It was found, however, that the annual examinations had taken place before the day fixed by the Secretary for the arrival of the Board at the Academy, so that it was impossible for the Board to conform literally to his request The new practice has grown up since the former methods of examination have gradually been superseded by examinations almost entirely in writing. The Board does not undertake to condemn the change which has taken place, and which makes the functions of the Board of Visitors at Annapolis so essentially different from those of the Visitors at West Point, but the subject is called to the attention of the Secretary for such consideration as he may deem expedient. If provision should at any time be made for the organization of the Board of Visitors shortly after the meeting of each Congress and for two or more visits of the Board in each year to the Academy, any objection to the present mode of visitation would be obviated. But under the present custom any suggestions of the Board of Visitors concerning the methods of study and examination and their results, which must of necessity be made from observations taken after the close of the studies and examinations, will naturally be less valuable than they would have been if made from observations taken before the course for the year had been completed and the standing of the cadets finally determined by the Academic Board. It is

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the opinion of the Board that in some form and to some extent, provision should be made for oral examinations which can be attended by the Board of Visitors, in accordance with law.

CONDITIONS OF ADMISSION TO AND DISCHARGE FROM ACADEMY.

The Board of Visitors respectfully recommend—

(1) That the age of admission to the Academy be fixed from 15 to 18 years, instead of 15 to 20, according to existing law.

(2) That the law providing a donation of one year's sea pay, amounting to $950, to cadets not entering the service at the end of the 6-years course be repealed.

(3) That every cadet shall be appointed one year in advance of entrance, except when, by reason of death or other cause, a vacancy occurs which can not be provided for by such appointment in advance; and that in each case an alternate shall be nominated at the same time; and that a course of study covering the work of one year preparatory to admission be recommended to each appointee and alternate as a desirable line of preparation for admission; and

(4) That no cadet reported deficient in either conduct or studies, and recommended for discharge by the Academic Board, shall, unless upon recommendation of that Board, be retained or reappointed in the Academy, or appointed to any place in the Navy, until his class shall have left the Academy and received their commissions.

The Board has carefully and fully discussed the question of the adoption of the plan under consideration by the Department, whereby the 6-years course prescribed for cadets is to be wholly under the supervision of the Superintendent and Academic Board of the Academy.

The system at present in force sends the cadet at the end of 4 years away from the Academy with a partial diploma, and keeps him nominally at sea for 2 years under new superior officers, and at the end of that time he returns for a few days to the Academy, when he is again examined in a limited number of studies and receives his commission as ensign in the Navy. During these 2 years the cadet is not under sufficient control or supervision as to his studies, which should not be discontinued at the end of 4 years. It is believed that under the new plan, by lengthening the present practice cruises and extending them over 6 years, the actual service at sea would not be much, if any, less than under the present system, and it would be more widely distributed over the entire course, and the large expense of sending abroad and bringing home the cadets within 2 years would be saved. The Board indorses the plan as appearing to be feasible and practicable, from such consideration as it has been possible to give it, and recommends it to the careful and immediate consideration of the Secretary of the Navy.

SUBJECTS OF STUDY AND STANDARD OF SCHOLARSHIP.

This topic is so closely connected with that of "Conditions of admission" that neither can well be considered apart from the other. If a given standard is to be reached by the Academy, and the course of study so graded as to attain that standard, the requirements for admission must have some proper relation to that end. It is not believed that the present standard of graduation is too high, but the fact that less than 40 per cent. of those who enter succeed in completing the course seems unmistakably to indicate a want of proper adjustment between the beginning and the end of the course. The rearrangement of the 6 years'

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course, as elsewhere recommended, will do much to correct this defect, and experience will suggest any desirable redistribution of subjects. There seems no doubt, however, that in order to make the course in engineering more nearly equivalent to that provided by the best technical institutions of the country, there should be a considerable increase of time devoted to both the theoretical and the practical branches included in that course.

GROUNDS, BUILDINGS, AND SANITARY CONDITION.

The Board finds that the grounds within the boundaries of the original Academy limits are in a high state of improvement, and both grounds and buildings are models of neatness and cleanliness. The sanitary condition is excellent.

The work of improving the recently acquired grounds is progressing in a satisfactory manner and as rapidly as is consistent with an economical expenditure of existing appropriations.

In various communications submitted to the Board by the officers in charge of the several departments at the Academy the needs of the institution in the form of new buildings are fully stated. It is asked that the old frame buildings on the *Phlox's* wharf be removed and a substantial brick or stone building be constructed on the same ground for the storage of the fire apparatus, yard trucks, and wagons; and that an additional two-story brick building be built adjoining the dynamo room, of ample capacity for paint shop and masons' storeroom below and carpenter shop above. Extensive repairs are asked for the observatory, and an additional building, 40 by 50 feet, for the use of the department of astronomy.

The department of ordnance and gunnery asks for the construction of a new building to contain a large fencing room, a model room, a storeroom, offices for the department, and four recitation rooms.

The Board ascertained that the frame buildings on the *Phlox's* wharf are old, somewhat dilapidated, and unsuitable for the uses to which they are now applied, and that the carpenter shop, paint shop, and room for masons' stores are much too small for their respective purposes.

While most of the cadets are quartered in a large and well-arranged building, which contains recitation rooms and mess room, and is convenient to the armory, a small proportion of them have to be quartered at an inconvenient distance from mess room, recitation rooms, and the armory.

Some of the officers on duty at the Academy are furnished quarters free of charge; others are compelled to hire quarters, quarters being assigned by the rule of seniority, thus taxing the juniors, who receive the least pay, with the expense of quarters, when, in the opinion of the Board, they should be all quartered within the grounds and all treated alike.

In view of the increasing number of cadets incident to the new apportionment of Representatives in Congress, additional cadet quarters will have to be provided at no distant day. It is important that all the cadets should be quartered in the same building or in adjoining buildings and near the mess room and recitation rooms.

It is evident to the Board that the absolute necessities of the institution will soon demand repairs of and additions to a number of the old buildings and the erection of a number of new ones, but the Board has not been able, in the limited time at its disposal, to make such investi-

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gation as would warrant it in making specific recommendations of improvements. Therefore the Board recommends that the Secretary of the Navy appoint a commission of competent persons to carefully investigate the whole subject and form a general plan for the future improvement of the Academy grounds, and report to him in detail such repairs and additions as are necessary to existing buildings and such new buildings as the necessities of the institution imperatively demand, and that the Secretary submit the report to Congress.

The Board finds the Naval Hospital in a state of dilapidation, the roof greatly injured, if not destroyed, by rust, and the porches and outside woodwork of the building in a state of decay. Having never been used for any considerable length of time as a hospital by the Navy or by the Academy in any other way than as storage rooms, no care has been given to its preservation. The Board does not see how it could be advantageously utilized by the Academy, and therefore recommends that a plot of 10 or 15 acres of ground around it be laid off and, with the building, sold to some enterprising hotel or other company.

SEAMANSHIP, ORDNANCE, AND NAVIGATION.

The various drills and exercises in seamanship, gunnery, infantry, and artillery tactics were very creditable, and show that nothing has been neglected in the details of instruction. It is gratifying to observe the interest manifested by the cadets in these exercises.

The original plan for the armament of the practice vessel now building for the Academy included a 5-inch breech-loading rifle on a central pivot carriage. The Board does not concur in the recommended change involving the removal of this gun. In the opinion of the Board cadets should have practice in firing a heavy gun with a lanyard; firing a gun with a shoulder piece is quite a different matter.

In navigation the course is so complete that the Board finds nothing to recommend except the addition of a model, somewhat like the one in use at the Compass Office in Washington, to show the causes of the deviation of the compass, and how the same may be counteracted—which will be very useful in the instruction of the cadets.

DISCIPLINE, DRILL, PRACTICAL EXERCISES, ADMINISTRATION, AND POLICE.

The proficiency shown by the cadets in infantry tactics, fencing, bayonet, cane, and setting-up drill reflects great credit on themselves and their instructors.

The buildings, grounds, and quarters are most admirably policed and great care and attention are paid to cleanliness and neatness.

The officers in charge of the Academy are able men, and deserve the highest commendation. They seem to be careful and conscientious in the discharge of their important duties, aiming to attain a high degree of discipline and, at the same time, to administer the laws and rules of the Academy with absolute justice to all. In most respects the cadets respond to the efforts of their superiors, so that it may be said that, taken altogether, the Academy is moving straight forward to the accomplishment of the high purposes the Government had in view in its establishment. But the Board regrets to be obliged to make one criticism. The odious, brutalizing and un-American habit of hazing has not, as yet, entirely disappeared from the Academy. The efforts that have been made for its extermination, it is gratifying to say, have been

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largely successful, but there yet lingers among the cadets a degree of class feeling that is extremely detrimental. This is, no doubt, difficult for young men of the ages of those at the Naval Academy fully to comprehend and always act upon the broad principles of justice and equity that generally prevail among educated and broad-minded men; and yet the very purpose of the liberal education the Government bestows upon those who are the objects of its care here is to make them officers who, loving justice, will always defend the right. The lesson they are to practice throughout life they ought to learn and practice here—to hate wrong and oppression. Looked at from a proper standpoint, nothing is more brutal, not to say cowardly, than for the strong to oppress the weak; or for a superior in rank to take advantage of his position to wrong an inferior. Though young men may in moments of recklessness and mirth disguise the truth from themselves, yet this is really the spirit that prompts those of a higher to degrade and insult those of a lower class. Cadets do not always, it seems, observe the very broad line of demarcation that separates innocent pranks that may create temporary mirth and amusement from the imposition of humiliating conditions of existence that last as long as a whole year of academic life.

The Board is glad to be able to report that there is now at the Academy only a relic of the hazing that in times past was so disgraceful, and the officers in charge are taking what they believe to be wise and proper steps to eradicate, as far as may be, certain false ideas of honor that still linger among the young men and manifest themselves now principally in certain extravagant notions of fidelity to one class at the expense, sometimes it may be, of even official duty and honor itself. The Board certainly does not deprecate a proper class pride, and would say nothing that would lessen a true spirit of emulation, but it does sincerely hope that every effort will be made in the future, not only as it is sure will be the case by the officers in charge, but also by the cadets themselves, to break down unnecessary class antagonisms and to cultivate a broader spirit of love and regard that shall embrace the whole academic corps—a spirit that will prompt the strongest and most influential cadet to be always foremost in coming forward to protect the weak and inexperienced of whatever class from wrong and oppression. This is the true spirit of American institutions and it should control and inspire the conduct at all times of everyone who is to be an officer in the American Navy.

STEAM, MATHEMATICS, PHYSICS, AND MECHANICS.

The Board has given such examination into the condition and needs of the various departments named as was practicable in the brief time at its command, and while its investigations have necessarily been of a casual character, it has seen much to commend in each of said departments, and nothing to condemn.

The department of steam engineering is admirably organized, and the instruction is of such practical character and usefulness as to commend it unreservedly. In the trend of public thought towards polytechnic or industrial education, it is gratifying to find the idea so well exemplified in this Government Academy.

The principal wants of the departments are specified by the officers in charge to be as follows:

The capacity of the machine shop should be enlarged by the addition of twenty-five machine tools, with a new engine to furnish the increased

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power to operate the same. This would involve an expense of about $20,000. The pattern shop needs to be enlarged, and ten power hand turning-lathes added.

The steam building should be enlarged for these changes, and a room of sufficient size fitted on the second story for a designing room for the engineer division.

It would be hard to speak too highly of the department of physics. The instruction here is of a high order and the results most gratifying. In view of imperative needs of the Academy in other directions, the Board has been impressed with the apparent completeness of this department and the absence of any pressing demand calling for additional appropriations at this time.

The only requirement is likely to be an addition to the laboratory, to afford additional rooms required for the instruction of the cadets in the practical applications of the principles of light, heat, and electricity.

Concerning the expediency of lighting the buildings and grounds of the Academy by electricity, and the construction of a separate plant for that purpose of ample capacity; the Board reports favorably.

In all cities and towns of any considerable size throughout the country—in State and municipal public buildings, in public parks, and in factories, stores, churches, and places of entertainment in all the States, the system of electric lighting prevails. It is the modern method, and there can be no good reason why it should be longer withheld from an institution so important and prominent as this Naval Academy, especially in view of the conceded fact that electric light is superior to gas or other light in respect to preservation of the eyesight.

ESTIMATE OF COST OF ELECTRIC-LIGHT PLANT.

Two boilers, two engines, pumps, pipes, belts, and foundations	$12,000
Four dynamos, foundations, regulators, and test instruments	9,000
Inside wiring for 3,000 lamps	12,000
Underground conductors	15,000
Extra fixtures and incidentals	2,500
Building 100 by 32 feet	4,500
Total	55,000

In the departments of mathematics and mechanics the well-earned and enviable reputation of the Academy is being well maintained.

There is some complaint of a lack of time to secure the very best results, every moment being crowded by the urgency of the demands upon it. Should the course of study be changed to one of 6 years at the Academy, as has been suggested, doing away with the nominal 2 years' sea voyage, this complaint could readily be remedied.

ENGLISH STUDIES, MODERN LANGUAGES, DRAWING, PHYSIOLOGY, AND HYGIENE.

The Board finds that the study of the English language, its structure, development, syntax, and composition, has a place in the first year's course and the first half of the second year.

Considering the fact that the English language is being learned by constant use in reading and writing it in the other departments, the time given to this study is quite sufficient. The examination papers in the departments of law and history show generally a fairly good command of language and correct grammar and spelling.

In any revision of the course of English studies which may be made, the Board recommends that a limited amount of time should be allotted to elocution.

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History is taught in the first year and during the first half of the second year. Necessarily the merest outlines can be learned; but the text books used, supplemented by the comments of the instructors, are well adapted to exciting an interest in and taste for the subject and laying a foundation for future reading.

In the first term of the second year there are two lessons a week for 16 weeks on the Constitution of the United States; and in the second term of the fourth or last year spent at the Academy there are two lessons a week for 16 weeks in marine international law—that is, in the line division. The engineers do not study this subject, their whole time being fully occupied in branches more important in view of the special qualifications requisite for an expert engineer.

Of course a few hours' study each week for 16 weeks can not result in any very extended knowledge of international law, but the powers and duties of a naval officer under various given conditions that may confront him in his contact and intercourse with the citizens and officials of other governments can be defined and explained. This subject, in the opinion of the Board, should be studied during the whole 2 years the cadets are at sea, and proficiency in it should have some weight in the examination at the end of that period, when he receives his commission as an ensign.

French is studied during the first, second, and third years, but not during the fourth. The time allotted to this study is ample for the acquisition of a sufficient knowledge to read it easily, and those cadets who have special aptitude for the acquisition of languages attain very creditable and in some cases remarkable proficiency in the French tongue.

Physiology and hygiene only appear in the last 4 months of the 4 years course at the Academy. There is no room for these sciences before that, and there is no more appropriate place for them than just before the cadet is to be sent out and forced to rely largely upon himself in the preservation of his health and physical vigor and efficiency. It is worthy of mention that the evil effects of all kinds of stimulants are fully explained to the young men and they are most thoroughly impressed with the importance of temperance—temperance in diet and drink, and moderation in all things, the golden rule of the physical being.

Cognate to these studies is the branch of physical training. This can not be surpassed. The erect bearing, elastic tread, and vigor of movement of the cadets attest the excellent work of this department.

The fencing, broadsword, and other gymnastic exercises, as well as the exercises in the actual duties of sailors on board the *Wyoming*, all excited admiration, and promise the display of physical prowess whenever the emergencies of their profession shall demand it.

In the department of drawing only mechanical and descriptive geometry drawing are prescribed. These are taught during the whole of the second year and the first term of the third year, 12 months in all; but very little time in the aggregate is given to this study, and the amount to be crowded into the 4 years does not permit any more time for this department, which is of growing importance owing to the great activity of the age in mechanical science, art, and invention.

This is the complaint of every department, lack of time to properly instruct the cadet, owing to the great number of branches of learning he must pursue *pari passu*.

The making of appointments a year in advance will tend to correct this evil.

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THE LIBRARY.

The library in all its appointments is in good condition and now contains 31,000 volumes. It seems to be well supplied with a good selection of the best literature of the day, especially with the recent publications on naval science and maritime warfare, thus placing within reach of officers and cadets the means of keeping themselves informed of the rapid advances in their profession.

The constant use made of the library shows that it is appreciated and is fulfilling its purpose. The present restriction on the binding of books works unfavorably for the usefulness and permanent good of the collection, and it is strongly recommended that the limitation be removed and this library placed on the list of "unrestricted libraries," and a suitable appropriation made for binding, to be increased as the library grows older and larger and the expense of keeping the books in repair increases.

It would have been gratifying to the Board to mention by name many of the officers, the results of whose intelligent and persistent labors in elevating the character and promoting the success of the Academy have been so clearly perceived during the present visitation; but the high standard of excellence attained in almost every department forbids discrimination.

The Board desires to extend to Capt. R. L. Phythian, the Superintendent, and to the whole corps of his assistants, its congratulations upon the superiority of their work, and take occasion to commend them to the favorable consideration of the Navy Department, the President, and Congress.

We have the honor to be,

Very respectfully, your obedient servants,

WM. E. CHANDLER, U. S. Senate, *President.*
H. A. HERBERT, M. C., *Vice-President.*
ISHAM G. HARRIS, U. S. Senate,
WILLIAM C. WALLACE, M. C.,
J. P. DOLLIVER, M. C.,
JAS. A. GREER, Commodore, U. S. Navy,
G. N. TILLMAN,
A. R. MCGILL,
GEO. W. ATHERTON,
EVERARD BIERER,
HENRY H. SMITH,

Members.

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INDEX OF SECRETARY'S REPORT.

	Page.
Acts authorizing construction, *etc.*, of vessels:	
March 2, 1891	3
August 3, 1886	4
March 3, 1887	6
September 7, 1888	6
March 2, 1889	6
June 30, 1890	5, 6
March 2, 1891	6
Advertisements	3, 5
American Bell Telephone Company	137
American Projectile Company	16
Ammunition	13
Annapolis, experiments made at	11
Appropriations	11
Armor	10–13
Armored vessels, *see* Ships, *etc.*	
Baltimore, Md., iron works at, *see* Columbian Iron Works.	
Bath Iron Works Limited	4, 5, 9
(*See also* Iron works.)	
Battle-ships	3
Bethlehem Iron Company	10, 11, 12
(*See also*, Iron Works.)	
Bids, *see* Proposals.	
Bureaus to prepare plans, *etc*	5
Calibers, *see* Ordnance.	
Carpenter projectiles, *see* Projectiles.	
Cartridges, *see* Ammunition.	
Castings	5
Chile, matters in	21–30
Coal endurance	3, 5, 8
Coaling stations	3
Columbian Iron Works	8
(*See also* Iron works.)	
Commerce destroyers	3
(*See also* Ships, *etc.*)	
Commission, vessels placed in	6, 7, 19
(*See also* Ships, *etc.*)	
Constructions, new	3
recent, progress of	6
Contracts for vessels	4–7
Correspondence, Chilean, *see* Chile.	
Courts-martial, *etc*	47
Decks, protective, *see* Ships, *etc.*	
Delaware, capes of	9
Displacement:	
Protected cruiser No. 13, 7,500 tons.	
Terror, the, 3,990 tons.	
Amphitrite, the, 3,990 tons.	
Monadnock, the, 3,990 tons.	
Puritan, the, 6,060 tons.	
Bennington, the, 1,700 tons.	
Harbor defense ram, 2,050.	
(*See also* Ships, *etc.*)	

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	Page.
Dock, vessels to	7
(*See also* Ships, *etc.*)	
Dry Dock Commission	7
Engines	4, 9
Enlisted men	43
Ericsson Coast Defense Company	17
Estimates	4, 5, 45
(*See also* Statistics.)	
Experiments in armor	11, 12
(*See also* Armor.)	
Firminy projectiles, *see* Projectiles.	
France, armor manufactured in	11
(*See also* Armor.)	
Gunboats, *see* Ships, *etc.*	
cotton	15
Guns, *see* Ordnance.	
Harbor-defense ram	4, 5, 6
(*See also* Ships, Vessels, *etc.*)	
Proposals for construction of, *see* Proposals.	
Harvey process, *see* Armor.	
High explosives, *see* Powder, *etc.*	
Horse power, *see* Power.	
Increase of the Navy	30–37
Acts authorizing	3–6
Indian Head, trials of armor plate at	12, 13, 19
(*See also* Armor.)	
Iowa Iron Works	5, 6
(*See also* Iron Works.)	
Iron Works:	
Columbian	8
Bath Iron Works, Limited	4, 5, 9
Iowa	5, 6
Union Iron Works, of San Francisco	4, 8
William Cramp & Sons' Ship and Engine Building Company of Philadelphia	4, 8, 9
Bethlehem Iron Company	10, 11, 12
Machinery	4, 7
engines	4, 9
Manufactures, domestic	10, 11, 12
Massachusetts, the	6, 8
(*See also* Ships, *etc.*)	
Mercantile vessels	3
Militia, naval	44
Monitors	7
(*See also* Ships, *etc.*)	
Naval Academy	46
Observatory	66, 67
Report of Board of Visitors,	633–641
Stations:	
Asiatic	9
North Atlantic	10
South Atlantic	10
Pacific	10
Navy-yard plants	48–49
employment in	49–55
New Navy	10
cost of	55–57
New York	4
navy yard	8
Nickel steel	8, 11
matte	11
(*See also* Steel.)	
Norfolk navy yard	8
North Atlantic station	10
(*See also* Naval stations.)	

Digitized by Google

	Page.
Ordnance	13–15
establishments	18, 19
Pacific Coast, naval defense of	19
Personnel of the Navy	38–43
Plans *and* specifications	3, 5
change in, for harbor-defense ram	5
for construction of 112-ton torpedo cruiser	5
Plants	4, 5, 11
to create	6
for manufacture of armor	10
navy-yard	48–49
Plate, *see* Armor.	
Powder *and* high explosives	15, 16
(*See also* Ammunition.)	
Power, horse	5, 9
(*See also* Ships, *etc.*)	
Practice vessel, steel	6, 9
(*See also* Ships, *etc.*)	
Projectiles	12, 16
Firminy	12
Carpenter	12
Proposals for construction of vessels	3–6
Propulsion, *see* Triple-screw.	
Revenue Marine Service	68
San Francisco, iron works at	4, 8
Shipbuilders *and* shipyards:	
Harrison Loring's	8
William Cramp & Sons'	4, 8, 9, 12
N. F. Palmer, jr., & Co	9
(*See also* Ships, *etc.*)	
Shipbuilding industry, to distribute more widely benefits of	6
Ships, vessels, *etc*	3, 4
racing of	3
armored	6, 7
work on, satisfactory	7
building of, contracts	4
trial trips	7, 8, 9
shipyards	4, 8
cruises of	7
two most important, in Navy	4
displacement of	7
cruisers	3, 4, 8
harbor-defense ram	4, 5
torpedo boats	5
new, placed in commission:	
Chicago.	
Yorktown.	
Petrel.	
Charleston.	
Baltimore.	
Cushing.	
Vesuvius.	
Philadelphia.	
San Francisco.	
Newark.	
Concord.	
Bennington.	
Miantonomoh.	
remaining under construction:	
Puritan.	
Amphitrite.	
Monadnock.	
Terror.	
Maine.	
Texas.	
Monterey.	

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Page

Ships remaining under construction—Continued.
New York.
Cruiser No. 6.
Cincinnati.
Raleigh.
Detroit.
Cruiser No. 12.
No. 9.
No. 11.
No. 10.
Practice vessel.
Harbor-defense ram.
Gunboat No. 5.
No. 6.
Indiana.
Massachusetts.
Oregon.
Protected cruiser No. 12.
Torpedo cruiser.
boat No. 2.
Protected cruiser No. 13.
coast defense 7
monitors 7
launched 7, 8
progress in construction 7, 8
docking 7
protective decks 8
armored 11
unarmored 8
horse power 9
speed 3, 4, 9
endurance, coal 3, 5, 8, 9
old wooden, of the Navy:
Lancaster, the
Pensacola, the
Marion, the
Alliance, the
Mohican, the
Iroquois, the
Thetis, the
Kearsarge, the
Essex, the
Yantic, the
Adams, the
Omaha, the
Swatara, the
Nipsic, the
Enterprise, the
South Atlantic Station 10
(*See also* Naval Stations.)
Specifications *see* Plans.
Speed 3–5
Stations, coaling *see* Coaling.
naval *see* Naval.
Statistics 5, 6, 9, 11, 12, 13, 37, 45, 56, 57–65
Steel casting, solid 5
nickel 8, 11
Stores, naval, consolidation of 47–48
Tables 13, 37, 56, 58, 59, 60, 61, 63–65
(*See also* Schedules.)
Tests of armor, *etc. see* Armor.
vessels *see* Ships.
Torpedo tubes 3
(*See also* Ordnance.)
boats 5, 6
cruiser of 750 tons 5
112 tons 5

Digitized by Google

	Page.
Torpedoes	16–18
Trial trips	7, 9
(*See also* Ships, *etc.*)	
shop	7
of armor-plate, *etc.*, *see* Armor.	
ordnance	13, 14
Triple-screw propulsion	3
Union Iron Works	4, 8
(*See also* Iron Works.)	
United States, performance of work on ships in	4
armor manufacture in	10
Projectile Company	16
Vessels *see* Ships, vessels, *etc.*	
Wooden ships of the Navy *see* Ships.	

Digitized by Google

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LIST OF PAPERS FORMING APPENDIX.

	Page.
Office of Secretary of the Navy:	
estimates for 1893	69–76
schedules of contracts	77–87
condemned vessels sold	83
receipts from sales of public property	88–93
Bureau of Yards *and* Docks:	
Report of *Commodore* N. H. Farquhar, chief	95–102
estimates, expenditures, appropriations, *etc*	103–120
Bureau of Equipment:	
Report of *Commodore* George Dewey, chief	121–145
Superintendent of Naval Observatory	122–131
table of repaired chronometers	128–131
Superintendent of Nautical Almanac	132–134
Inspector of electric lighting	135–139
Superintendent of compasses	139–142
estimates for fiscal year ending June 30, 1893	143–145
Bureau of Navigation:	
Report of *Commodore* F. M. Ramsay, chief	147–206
movements of ships	151–166
Superintendent of Naval Academy	167–170
Board of Visitors	633–641
concerning practice cruiser	169–170
Hydrographer	171–174
branch offices	174–176
Estimates of appropriations required for fiscal year ending June 30, 1893	202–206
Bureau of Ordnance:	
Report of *Commodore* W. M. Folger, chief	207–290
torpedoes	217–218
armor trials	227
officers performing ordnance duty	234, 235
appropriations	236
estimates	238, 239
Bureau of Construction *and* Repair:	
Report of *Commodore* Theodore D. Wilson, chief	291–406
armor required for vessels now building	301–302
estimates of appropriations required for fiscal year ending June 30, 1893	311–312
Appendices	313–316
Report of work on vessels	318–375
Bureau of Steam Engineering:	
Report of *Engineer-in-Chief* G. W. Melville	407–487
Appendices	474–486
Bureau of Provisions *and* Clothing:	
Report of *Paymaster-General* of the Navy	489–581
financial and other tables	493–581
estimates of appropriations required for fiscal year ending June 30, 1893	580–581

Digitized by Google

Page.

Bureau of Medicine *and* Surgery:
Report of *Surgeon-General* 583–613
estimates of appropriations required for fiscal year ending June 30, 1893 593
classification of diseases 594–608
mortuary record 609
contracts for naval laboratory, *etc* 610–615
contracts and proposals 611–613
Report *Commandant* U. S. Marine Corps 615–628
estimates of appropriations required for fiscal year ending June 30, 1893 624–628
of Capt. Cochrane 620
school of Application 621
Board of Visitors, Naval Academy 633–641

Digitized by Google

INDEX TO APPENDIX.

	Page.
Ackerman's conglomerate shot, trial of	261
Almy Water Tube Boiler Company, boiler put in *Stiletto*	264
Aluminum Brass and Bronze Company, air vessels for torpedoes	217
torpedo works of	267
Ammunition, stowage of	210
Annapolis, ordnance proving ground, work accomplished	225
tests of armor	227, 228
report of inspector	257
tests and work accomplished	257–261
Apprentices' outfit, estimate	203
Apprentice training ships, movements	165, 166
Appropriations, expenditure by Construction *and* Repair	314
balances available	497
for steam machinery	407
required, *see* Estimates.	
expended, Yards *and* Docks	111, 114
for Academy, statement of	168
Archives and documents, Hydrographic Office	191
Ardois system of electric night signals	136
Armament for new vessels installed and completed	221
Armor, arrangement to procure	220
and backing, fitting of, to vessels, report of board	395–406
remarks of Bureau of Construction	306
dimensions of side-armor bolts	402–404
dimensions of turret bolts	404–406
plates, experiments at Annapolis	257
Indian Head	262–263
piercing projectiles	212
experiments at Annapolis	257
tests at Annapolis	257
Indian Head	262–263
character of plates and makers	277
result of tests	227–230, 278
ballistic details	278–290
treatment by Harvey process	224
Armored vessels, list of	318
Artesian well, Mare Island	101
Asiatic Station, movements of vessels	160
Assistant to Bureaus recommended	292
Bellevue magazine, bids for repairs	237
Beriberi, cases of	590
Bethlehem Iron Company, air vessels for automobile torpedoes	217
armor supplied by	220
contracts for gun-forging	223
type of 6-inch gun	209
Binnacles, *see* Compasses, report Superintendent.	
Bisbee's accelerating cartridge, trial of	261
Bliss Company, E. W., contracts with, for torpedoes	218
Board of Visitors, Naval Academy, report	633–641
Brush Electric Company, contracts with	135
Bubble chronometer of *Passed Assistant Engineer* Webster	140

Digitized by Google

	Page.
Bullivant torpedo-defense nets	219
Canet night sight ordered	233
Cannon, breech-loading rifle	207
Carnegie, Phipps & Co., armor plates, test of	221
contract to supply armor	221
Carpenter Steel Company, air vessels for automobile torpedoes	217
armor-piercing projectiles	212, 227
torpedo work of	267
Cartridge, Bisbee's accelerating, trial of	261
Charts, perparation and issue	176–193
(*See also* Hydrographic Office.)	
Chattels, value of, pertaining to Navy	523
Chelsea, transfer of part of grounds to Treasury Department	584
Chief clerks, increase of salary recommended	292, 492
Cholera, cases of	589
Chronometers	124, 128–131
Civil engineers, appointment of	97
establishment, expenditures for	109
estimates for	119
Civilians employed at yard on clerical duty, amount paid	109
Clerks, Navy, ashore and afloat, estimates to pay	74
Clothing and small store fund, condition	500
Clothing fund, naval cadets	493
Coal, facilities for handling	96, 100
purchased	121
Cob dock, New York	99
Columbian Exposition, representation by Marine Corps	618
Compasses, Superintendent, report of	139
instruments purchased	139
repaired	140
compensating binnacle	140
bubble clinometer	140
Thomson instrument	140
classes for instruction	140–141
vessels supplied with compasses	141
difficulties encountered	142
office force inadequate	142
Condemned property, receipts from sale of	88–93
vessels, sale of	83–87
Construction *and* Repair, report of Chief of Bureau	292–406
assistant to chief recommended	292
chief clerk, increase of salary recommended	292
chief draftsmen, increase of salary recommended	292
surveys and repairs on vessels	293, 313
vessels condemned and recommended to be sold	293
Monitors, single-turret, suggestions	293
Intrepid, sale recommended	294
wooden steam vessels, conditions	294
Torpedo cruiser No. 1	295
increase of appropriation recommended	295
vessels in course of construction	296
Maine, armored cruiser	296
Harbor-defense ram, Ammen's	297
Protected cruiser No. 13	297
Torpedo boat No. 2	299
armor for vessels building	301
plant at navy yards, improvement of	304, 375
standing fittings and armor fastenings	306
sheathing of steel vessels	307
speed trials, progressive	308
experimental tank	308
building up Navy, Bureau's satisfaction at	309
estimates	311
appropriations expended	314
expenditures on vessels	315
payments for vessels, under contracts	316
vessels, tables of, armored	318

Digitized by Google

Page.

Construction and Repair, report of Chief of Bureau—Continued.
vessels, monitors, single-turret 320
unarmored steel 322–323
iron and wooden, steam 326–327
sailing, wooden 328
steam tugs, steel, iron, and wood 328
unfit for service 330
building, condition of work 332–375
Cruiser 7 332
Puritan 333, 358
Miantonomoh 334, 358
Maine 334, 358
Terror 336, 358
Texas 337, 359
Raleigh 337, 359
Amphitrite 338, 359
New York 339, 361
Protected cruiser No. 12 ..... 340, 362
Indiana 340, 362
Massachusetts 341, 362
Cruiser No. 6 ..... 344, 365
Oregon 345, 365
Cruiser No. 9 ..... 345, 366, 367
Cruiser No. 10 ..... 347, 367
Cruiser No. 11 ..... 349, 369
Tugboat No. 1 ..... 350, 369
No. 2 ..... 350, 370
No. 3 ..... 351, 370
Gunboat No. 5 ..... 351, 371
No. 6 ..... 354, 372
Harbor defense ram No. 1 ..... 356, 374
Steel Practice vessel 356, 374
Cincinnati 358
Monadnock 360
Monterey 363
Consular officers, hydrographic information from 192
Contingent expenses Navy Department, estimate 69
Navy, estimate 70
Contracts and proposals, schedules, Secretary's Office 75
Torpedo boat No. 2 ..... 76, 82
Harbor defense ram No. 1 76
steel gun forgings 77
machine tools 77–81
Protected Cruiser No. 13 81
steel plates 82
rubber washers 82
under Yards *and* Docks 114
electric-light plant on vessels 138
compensating binnacle 140
under Ordnance 237
dredging at Craney Island 231
magazine at Sitka 231
steel shell lighter 233
floating *or* tug crane 233
supplies, Provisions *and* Clothing 512–522
Medicine *and* Surgery 610
Marine Corps 627, 628
Cramp, B. H. & Co., air vessels for automobile torpedoes 217
Craney Island magazine, dredging channel to 231
Creusot armor plates, tests of 227
Cushing, the, horse-power trials 474
torpedo launching tube to be mounted 219 220
Deep-sea soundings 171–188
Defense, naval, mine designed 267
Delegates to medical associations 588
Dengue, cases of 590

Digitized by Google

	Page.
Deposits of miscellaneous receipts	88–93, 139
Derelicts	173
Diseases in the Navy	589, 590, 594–608
Dover, N. J., construction of magazine at	231
Distances determined	172
Draftsman, chief, Bureau Construction, increase in salary recommended	292
Dredging Eastern Branch Potomac	100
Driggs' fuse, trial of	261
common shell	261
Driggs-Schroeder guns, contract for	215
Dry dock, Port Royal, S. C	100
League Island	96, 99
Port Orchard	101
New York, recommended	96
Portsmouth, N. H	98
Boston	98
Philadelphia	96
Norfolk	96, 100
Pensacola	101
Mare Island	101
Dynamite guns on the Vesuvius	221
Dynamo, multipolar, Edison design	135
Edison Company electric motors for guns	214
General Electric Company, contract with	135
Electrical laboratory, Torpedo Station	273
useful work of	273
Electricity, communicating ranges, *etc.*, by	233
Electric lighting, report of Superintendent	135
plants installed	135
search lights	135, 136
signaling, by electric night signals	136
interior means of communication	136
schedule of bids	138
motor for controlling guns	214
plant, contract and proposals	138
navy yards	96
Ellis Island magazine abandoned	231
Emmensite explosive, experiments with	211, 269
Engineer Corps, insufficient in number	430
(*See also* Bureau of Steam Engineering.)	
Engraving machines and engraving	172, 188
Enlisted men, instruction at gun factory	275
report of inspector	274
length and details of course	275
weekly record and examinations	276
number under instruction, and results	276
recommendations and suggestions	276
instruction at torpedo station	232, 273
at Washington gun factory	232
employment at Indian Head	232
Enlistment, examinations, physical, for	591, 607
Equatorials, 9.6 and 26-inch	122
Equipment, Bureau, report of Chief	121
vessels equipped during year	121
coal purchased	121
hemp manufactured	121
ropewalk and equipment shops	121
estimates for	143
Ericsson Defense Company, contract for submarine gun	219
Estimates, salaries, Secretary's Office	69
Office Judge-Advocate-General	69
Library, Department	69
Office Naval War Records	69
contingent, Navy Department	69
Navy	70
printing and binding	70

Digitized by Google

	Page.
Estimates, pay of the Navy	70, 75
miscellaneous	70
Bureau of Yards *and* Docks	118, 120
Equipment	143
Naval Observatory	144
Nautical Almanac	145
Navigation	202, 203, 206
Hydrographic Office	202
Naval War College	204
Training Station	204
Academy	204, 205
Ordnance	238
Construction *and* Repair	311
Steam Engineering	460
Provisions *and* Clothing	580
Medicine *and* Surgery	593
Marine Corps	625
European manufactories, report on	240–246
Expenditures, vessels authorized and completed	504, 578
yards and stations	103, 104
Experimental tank recommended	308
Explosives, high, Du Pont & Co	211
manufacture, *etc.*, at Torpedo Station	269
Evolution, Squadron of, movements of vessels	155
Fish Commission	192
Fiske range-finders, reports on	230
Fletcher, F. F., report on ordnance developments in Europe	240–246
Flinder's correction of compasses	139
Floating *or* tug crane, contract for	233
Florian method, quadrantal correction	141
Geographical positions determined	187
Greenfell night sight, trial on Petrel	233
Gun carriages, pneumatic, trial of	230
cotton procured of Du Pont & Co	211
factory at Newport	211
improvement in	270
factory on Pacific coast, suggestion to establish	233
Washington yard, development and plant	223
report of superintendent	246–255
Harvey process, treatment of armor	224
lathes purchased	224
machinery for breech mechanisms	224
work done	224
good work of officers	224, 225
lists of work done	255–256
forging contracts, with Bethlehem Iron Company	223
Midvale Steel Company	223
mounts	213–216
proof of mounts at Indian Head	262
Guns *and* mounts, tests at Annapolis	260
Gunnery exercises, estimates	203
Guns heavy, transportation of	233
Hall, *Lieut.* M. E., automobile torpedo	217, 218, 266
Harvey process, treatment and trials of armor	224, 227, 230
Hemp, manufacture of	121
Holtzer armor-piercing shells, effect on plates	227
Hospitals, condition of	583
patients admitted	603
Hotchkiss Ordnance Company, delivery of guns	215
contract for launching tubes	218
experiments with Howell Torpedo	267
Howell Torpedo, delay in furnishing	217
extension of contract	218
experiments with	267
Hurst Reënforce Cartridge and Arms Company, agreement with	233
Hydraulic power, use of, controlling guns	214

Digitized by Google

	Page.
Hydrographic Office:	
Report of the Hydrographer	171
surveying operations	171
deep-sea soundings	171, 188
engraving machine	172
distances between ports	172, 188
pilot chart Northwestern Lakes	172
derelicts	173
terrestrial magnetism	173
estimates	202
Division of chart construction	176
force employed	176
work on U. S. S. Ranger	177
general charts	177
Great Circle sailing charts	177
general coast charts	177
special coast charts	178
harbor charts	178
charts engraved and published	179
charts corrected	182, 186
charts in course of construction	185
plate making and printing	183
magnetic variations	186
geographical positions	187
machines for engraving charts	188
Division of sailing directions	189
publications prepared and issued	189–191
vessels fitted out and supplied	191
archive documents	191
charts	193
notices to mariners	193
of supply and issue	194
recording corrections	196, 201
of Branch Offices	201
of Marine Meteorology	199
information from Navy vessels	192
vessels Fish Commission	192
Consular Offices	192
branch offices:	
Chicago, Port Townsend, Portland, New York, Boston	174
Philadelphia, Baltimore and Norfolk	175
Savannah, New Orleans, and San Francisco	175
Increase of the Navy, estimates for	311, 314
expenditures by Construction *and* Repair	314
Indian Head Proving Ground, experiments at	208
offers to erect buildings at	237
progress made at	226
suggestions for facilities	226
trials of armor	227–229
Influenza, *la grippe*, cases of	590
Insane of the Navy	591
Intrepid, survey and sale recommended	294
Judge-Advocate-General, estimates for office	69
Launching torpedo tubes, contract with Hotchkiss Ordnance Company	218
Library at Torpedo Station	274
Navy Department	69
Naval Observatory	126
Machinery afloat and at yards, cost and value of	513, 523
(*See also under* Bureau of Steam Engineering.)	
Magnetic instruments	125
variations	186
Magnetism, terrestrial	173
Manganese bronzes, test of	480, 483
Marine Corps, report of colonel commandant	615
increase of enlisted force recommended	615
desertions, legislation recommended	616

Digitized by Google

Page.

Marine Corps, promotion, examinations for 616, 619
quartermaster sergeants, additional, needed 616
school of application established 617, 621
important services of the corps 617, 618
barracks at Port Royal, appropriation asked 618
at Coaster's Harbor Island 618
Columbian Exposition, representation at 618
band, classification and pay of 618
uniform, board on changes 619
barracks, condition of 619
Sitka, erection of 619
enlisted men, number in the service 619
casualties among officers 619
enlisted men 619
Col. McCawley, remarks on death of 620
report of *Capt.* Cochrane, marines in Bering Sea 620, 621
estimates of paymaster 624
quartermaster 625
contracts and bids 619
Marshall, *Lieut.*, design of defense mine 267
McLean, *Lieut.*, design of defense mine 267
Measles, cases of 590
Medical Corps, vacancies in 588
Medicine *and* Surgery, Bureau, report of Chief 583
naval hospitals, sanatorium, *and* sick quarters 583
Museum of Hygiene 588
vacancies in Medical Corps 588
delegates to associations 588
yellow fever 589
cholera 589
smallpox 589
measles 590
influenza 590
dengue 590
beriberi 590
pension cases, action on 590
examination of recruits 591, 607
sick of the Navy, number and treatment 591
mortuary record 591–609
insane of the Navy 591
naval hospital fund, condition 592
estimates 593
diseases afloat, general aggregate 594, 608
detailed statement 594–607
yards *and* stations, general aggregate 599
detailed statement 600–603
naval hospitals, general aggregate 603
detailed statement 604, 607
vaccination, report of 607
diseases, ratio of each class, afloat 608
summary 608
contracts and offers, schedule 610–613
Meteorology, marine, division of 200
Michelson range-finder, trial of 230, 261
Midgeley Wire Belt Company, steel netting experiments 233
torpedo-defense nets 219
Midvale Steel Company, contracts for gun-forging 223
mounts for batteries 214
Mine, for naval defense, designed 267
Monitors, double-turreted, guns for 208
mounts for batteries 214
list of 318
single-turret, designs for new turrets 222
list of 320
Mortuary record 591, 609

Digitized by Google

	Page.
Museum of Hygiene	588
Nautical Almanac, report of Superintendent	132–134
publications during year	132–134
distribution	132
planets, new tables of	133
Jupiter *and* Saturn, tables of	133
assistants, efficiency of	134
astronomical papers	134
estimates	145
instruments	125
Naval Academy.	
Report of Board of Visitors	633–641
admission and discharge	634
study and standard of scholarship	634
grounds, buildings, and sanitary condition	634
seamanship, ordnance, and navigation	634
discipline, drill, police, etc	634
steam, mathematics, etc	634
English studies, modern languages, *etc*	634
Report of Superintendent	167
number of cadets, graduates, *etc*	167
properties purchased	167
buildings and grounds	167
practice ships	168
report of practice cruise	169
appropriations, statement of	168
estimates	204–206
cadet clothing fund	493
Naval Home	98, 105, 106, 118
Hospital fund, condition	592
estimates for	593
Observatory, report of Superintendent	122–127
Transit Circle	122
26-inch equatorial	122
9.6-inch equatorial	122
transit of Mercury	123
Venus	123
solar eclipse of 1893	123
meridian transit instrument	124
chronometers and time served	124
library and publications	126
nautical instruments	125
magnetic instruments	125
chronometers, competitive trial	128–131
sale of articles	139
estimates	144
offers to repair instruments	138
Naval War College, estimate	203
records, estimates	69
Navigation, Bureau, report of Chief	147–207
vessels commissioned, *etc*	147
Albatross, the, borrowed	147
routine at Academy and training station	147
War College building on Coaster's Harbor Island under construction	147
Naval Academy, failures of cadets	147, 148
suggestions	148
enlistments during year	148
continuous-service certificates issued	148
crews for receiving ships	148, 149
enlisted men, number required	149
increase recommended	149
citizenship for the honorably discharged	149
barracks for apprentices at Newport	149
Assistant to Bureau recommended	150
detailed movements of vessels	151–166
Naval Academy, report of Superintendent	167

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Page.
Navigation, Bureau, report of Chief—Continued.
Naval Academy, appropriations for 168
report of practice cruise 169
estimates 202-206
Navy-yards *and* stations, improvement of plant, recommendations 95-101, 375, 395, 422, 423
Construction department, Portsmouth, N. H. 375
Boston 378
New York 379
League Island 384
Norfolk 387
Mare Island 391
expenditures 314
work done by Bureau of Steam Engineering 422-429
Navy-yards *and* docks, condition and needs 95-108
value of sites 95
estimates for 105-108
expenditures 109-111, 504-509
Nickel-steel plates, test of 227-229
Night-sights, purchase and trial of 233
North Atlantic Station, movements of vessels 151, 154
Notices to Mariners 193
Ocean *and* lake surveys, estimates 203
Ordnance, Bureau, report of Chief 207-236
Report of Inspector of 246-255
naval, developments in Europe 240-246
estimates, recapitulation 207
breech-loading rifles 207
powder 210
ammunition, stowage 210
smokeless powder 210
high explosives 211
armor-piercing projectiles 212
common shell 213
main batteries, mounts for 213
secondary batteries 215
machine guns and small arms 216
torpedo board 217
automobile torpedoes 217
Howell torpedo 218
Hall torpedo 218
Whitehead torpedo 218
launching tubes 218
dirigible torpedoes 218
submarine gun 219
torpedo-defense nets 219
boats 219
submarine boats 220
armor contracts 220
armament of new vessels 221
monitors 222
gun-forging contracts 223
factory 223
armor trials 227
range-finders 230
pneumatic pressure, operating by 230
magazines 231
torpedo station 231
enlisted men, instruction of 232
miscellaneous 233
officers on ordnance duty 234
appropriations and expenditures 236
days' labor at yards, expenditures 236
civilians on clerical duty, payments to 236
contracts and offers 237
estimates 238

Digitized by Google

	Page
Ordnance proving ground, Indian Head	226, 227
report of inspector in charge	262
general work	262
proof of guns and mounts	262
powder proof	262
projectile tests	263
target structures	263
armor tests	263
proving ground, Annapolis	225
Ourdon-Kolb engraving machine	172
Pacific coast, gun factory on, suggested	233
Patrick torpedo	218, 219, 267
Pay Corps, increase recommended	493
Paymaster, Marine Corps, estimates	624
Pennsylvania Railroad Company, transportation of heavy guns	233
Pension cases acted on, Bureau Medicine *and* Surgery	590
Phillips & Co., shell of torpedo spun by	267
Plant at yards, improvement, *see* Navy Yards.	
Plate making and printing	183
Pneumatic pressure, trials of gun carriages	230
Port Orchard (Oregon) dry dock	101, 119
Port Royal, S. C., dry dock	119
barracks needed	617
Powder, proof, at Indian Head	262
smokeless, experiments with	271
smokeless	210, 211
brown, Du Pont & Co	210
prismatic, Laflin & Rand	210
Practice ships, Naval Academy, cruise	169
Prisons, naval, condition of	96
Printing *and* binding, estimates	70
Bureau Medicine *and* Surgery	593
Projectiles, armor piercing	212
Projectile, tests, at Indian Head	263
Property returns, abstract	512
Provisions *and* Clothing, Bureau, report of Chief	489, 581
naval supplies, treatment of	489
value on hand	489, 490
consumption of old	490
aggregate appropriation recommended	490
accumulation created	490
increased expenditures	490
bookkeeping, advantages of new system	490
arrangement, classification, and consolidation	491
purchases and custody, progress made	491
concentration of accounts of Bureaus	491
prompt delivery *and* contracts	491
real estate *and* chattels	505, 523
appropriations, account of	491
change in name of Bureau suggested	492
clerical force, increase recommended	492
chief clerk, increase of salary	493
clothing, *etc.*, for cadets, storekeeper's fund	492
increase of Pay Corps recommended	492
table, general financial statement	493
clothing and small-store fund	494
provisions *and* contingent appropriations	494–503
expenditures at shore stations	504
maintaining vessels, cost of	510
supplies at shore stations, value of	512
afloat, value of	523
real estate *and* chattels, value of	505–523
machinery plant at yards, value of	523
sales and deposits	524
open purchase requisitions	526
expenditures, comparative statement	527

Digitized by Google

Page.
Provisions *and* Clothing, Bureau, report of Chief—Continued.
table, proposals received, schedule 527–577
expenditures on vessels, completed 578
authorized 578
estimates 580
Provisions, Navy, estimates 580
Puget Sound, naval station at 101
Purchases, payments made 500
Quartermaster Marine Corps, estimates 627
Quarters for officers, Naval Academy 167
Range-finders, trial of 230
tables, computed at proving ground, Annapolis 262
Real estate *and* chattles, value of 505, 523
Redemann-Tilford Co., armor piercing projectiles 212
Retired list, estimate to pay 73
Rifles, breech-loading 207
Ropewalk, work at 121
Sailing directions 189
Sale of condemned vessels 83–87
government property, receipts 88
Sanitarium, Widow's Island 583
Search lights, contracts for 135
Sheathing bottoms of steel vessels 307
Shell, common, contract with United States Projectile Company 213
contract with American Projectile Company 213
R. A. Hadfield & Company's method 213
Shell lighter, steel, completed 233
Sick of the Navy, statistics 591, 594–608
quarters, Portsmouth, N. H 583
Sims-Edison torpedo, plant for, needed 267
torpedo 219
Sitka, Alaska, new magazine at 231
barracks, constructing 619
Smallpox, cases of 589
Solar eclipse 1893 123
South Atlantic Station, movements of vessels 153, 154
Boston Iron Works, construction of pneumatic gun carriage 231
Special duty, movements of vessels 163–165
Speed trials, progressive 308
Squadrons, movements of vessels 151–166
Standard Steel Casting Company, castings ordered from 214
Stationery, Navy Department, schedule of bids 75
Steam Engineering Bureau, report of chief 407, 487
appropriations, steam machinery 407
general operations 407
machinery of vessels, work done on 408–418
total cost 418
present condition 419–422
work at the various yards *and* stations:
Portsmouth 423
Boston 424
New York 425
League Island 427
Norfolk 428
Mare Island 429
Pensacola 430
New London 430
Key West 430
Naval Academy 430
Personnel of the Engineer Corps 430
number insufficient 430
withdrawal from technical schools 431
suggestions and recommendations for increase 431
course at Naval Academy 433
school of advanced instruction 435
privileges of the wardroom 435

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Page.

Steam Engineering Bureau, report of Chief—Continued.
Personnel of the Engineer Corps—Continued.
abolishment of the steerage 435
designing and inspecting machinery 436
assistant to engineer-in-chief recommended 437
enlisted men, engineers' force 437
contract trials of new vessels 441
data of performance of machinery 444
steel castings, discouraging experience regarding 446
new vessels, machinery under construction 448–459
changes in 448–459
estimates 460
Thornycroft boiler, test of 462–473
Cushing, horse-power trials 474–479
Manganese bronze, test of 480–483
launch boiler, test of Towne 484–487
Steel casting, Bureau of Steam Engineering 446
shell, lighter, bids for 237
vessels, sheathing to bottoms 307
Sterling Steel Company, armor-piercing projectiles 212
St. Helena, Norfolk, acquisition of property 100
Stiletto, new boiler put in 219
torpedo launching-tube mounted 219
Stores, consolidation and classification 491
purchase and custody 491
treatment of 490
value of, pertaining to Navy 489, 490, 512–523
Submarine boats, progress made in 220
gun, contract with Ericsson Defense Company 219
Surveying operations 171
Tank, experimental, recommended 308
Target structures, at Indian Head 263
Telephone circuits introduced on vessels 137
Terrestrial magnetism 173
Thomson-Houston Company, electrical motors for guns 214
contract with 135, 136
Thorndyke boiler, test of 462
Time service 124
Torpedo, automobile, supplying vessels with 217
board, appointment of 217
boats, *Stiletto* and *Cushing* 219, 220
defense nets of Midgeley Wire Belt Company 219
dirigible, of J. N. H. Patrick 218, 219, 267
the Sims-Edison 219
Station, Newport, report of officer in charge 231, 232, 263–274
results in various directions 232
instruction of enlisted men 232
officers of the station and duties 264
Stiletto and other torpedo boats 264
buildings and plant 264
gun-cotton factory 265
magazine, Rose Island 266
outfits 266
torpedoes 266
chemical laboratory 268
explosives, experiments, tests 269
gun-cotton, improvements in 270
smokeless powder 271
electrical laboratory 273
instruction of enlisted men 273
library 274
sanitary condition 274
estimates 203
Towels, washing, contract for 76
Towne launch-boiler, test of 484, 487
Training station, estimates 203
Transit instruments 124
circle 122

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	Page.
Transit of Mercury	123
of Venus	123
Transportation of heavy guns, agreement for	233
Traveling cranes, New York *and* Norfolk	96
Turreted vessels, list of	318, 320
Vaccination in the Navy	607
Vessels condemned, sale of	83–87
equipped during the year	121
supplied with electric plant	135
compasses	141
for testing gun mounts at sea, suggested	216
repaired by Construction *and* Repair	313
report as to fitting armor and backing	395–406
armor required, to be purchased by Government	301
contracts with firms	303
expenditures on new construction and repair	315
payments on building, construction, and repair	316
in commission, movements	151–166
North Atlantic Squadron	151–153
South Atlantic Squadron	153–154
Squadron of Evolution	154–158
Pacific Squadron	158–160
Asiatic Squadron	160–163
special duty	163–165
apprentice training ships	165–166
table of, armored	318
single turreted, iron	320
unarmored steel	322, 325
iron and wooden, steam	326, 329
wooden, sailing	328
tugs, steel, iron, and wood	328
unfit for sea service	330
condition of work on, building and completed	332–375
machinery of, cost	523
work on machinery	408–418
cost of	418
machinery, present condition of	419–422
new, contract trials of	441
machinery under construction	448
Vesuvius, trial of dynamite guns	221
torpedo boats that would overmatch her	222
Visitors, Board of, Naval Academy, report	633, 641
Whitworth & Co., rifle jacket furnished by	208
Whitehead torpedo, negotiations for	217–218
Winchester Repeating Arms Company, 4-inch rapid-fire gun	209
Yards *and* Docks, Bureau of, report of chief	95–102
electric lighting	96
naval prisons	96
civil engineers	97
foreman laborers	97
Naval Home	98
navy yards *and* stations	98–101
value of sites	95
increase of the Navy	101
chief clerk, increase of salary	101
dry dock, Port Orchard	101
estimates, recapitulation	101
Naval Home	106
yards *and* stations	105–108
for all purposes	118–120
expenditures, yards *and* stations	109–111
appropriations	111–114
contracts and proposals	114–117
Yellow fever, cases of	589
Yokohama, hospital at	587

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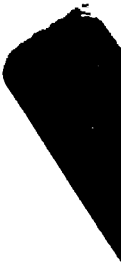
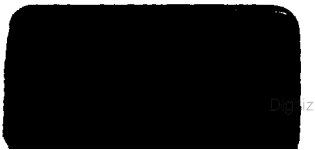
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